

kahneman and tversky prospect theory math example pdf

Introduction to Kahneman and Tversky's Prospect Theory

kahneman and tversky prospect theory math example pdf refers to the comprehensive mathematical framework developed by psychologists Daniel Kahneman and Amos Tversky to describe how individuals make decisions under risk. Unlike classical expected utility theory, which assumes rational decision-making, prospect theory accounts for observed human biases and behaviors, such as loss aversion and probability distortion. This theory has profound implications in economics, psychology, and behavioral finance, providing a more accurate depiction of real-world decision processes.

Background and Significance of Prospect Theory

Limitations of Expected Utility Theory

- Assumes individuals are rational actors maximizing expected utility.
- Fails to explain common irrational behaviors like risk-seeking in losses or risk aversion in gains.
- Overlooks psychological biases influencing decision-making.

Development of Prospect Theory

In response to these limitations, Kahneman and Tversky introduced prospect theory in 1979. Their goal was to model how people actually evaluate potential gains and losses, leading to more accurate predictions of decision-making behavior under risk.

Core Components of Prospect Theory

Value Function

The value function in prospect theory is defined on deviations from a reference point (often the current wealth level). It exhibits key features:

- Concave for gains – diminishing sensitivity
- Convex for losses – diminishing sensitivity
- Steeper for losses than for gains – loss aversion

This asymmetry captures the phenomenon that losses feel more painful than equivalent gains feel pleasurable.

Probability Weighting Function

Instead of objective probabilities, individuals transform probabilities through a weighting function:

- Overweight small probabilities
- Underweight large probabilities

This accounts for behaviors like lottery participation and insurance purchase.

Mathematical Formulation of Prospect Theory

Value Function Equation

The value function $v(x)$ is typically modeled as:

$$v(x) = \begin{cases} x^\alpha, & \text{if } x \geq 0 \\ -\lambda (-x)^\beta, & \text{if } x < 0 \end{cases}$$

where:

1. x = deviation from reference point (gain or loss)
2. (α, β) = parameters controlling curvature (usually $0 < \alpha, \beta \leq 1$)

3. λ = loss aversion coefficient (>1 , indicating losses loom larger)

Probability Weighting Function

The probability weighting function $w(p)$ can be modeled as:

$$w(p) = \frac{p^\gamma}{(p^\gamma + (1 - p)^\gamma)^{1/\gamma}}$$

where γ controls the curvature of the weighting function:

- $\gamma < 1$ = overweight small probabilities and underweight large ones
- $\gamma = 1$ = linear weighting (no distortion)

Example: Calculating a Prospect Theory Value

Setup of the Example

Suppose an individual faces a choice between:

- A sure gain of \$100
- A 50% chance to win \$200 and a 50% chance to win nothing

Using prospect theory, we want to evaluate which option the individual perceives as more valuable, considering the value and probability weighting functions.

Step-by-Step Calculation

1. Set parameters (example values):

- $\alpha = 0.88$, $\beta = 0.88$
- $\lambda = 2.25$ (loss aversion coefficient; not relevant here since no loss, but important in other contexts)

- $\gamma = 0.61$ (probability weighting parameter)

2. Calculate the subjective value of the sure gain (\$100):

$$v(100) = 100^{0.88} \approx 75.9$$

3. Calculate the weighted probability for the 50% chance:

$$w(0.5) = \frac{0.5^{0.61}}{(0.5^{0.61} + (1 - 0.5)^{0.61})} \approx \frac{0.5^{0.61}}{2 \times 0.5^{0.61}} = 0.5$$

In this case, with $\gamma=0.61$, the weighting is close to the objective probability, but generally, it would differ more.

4. Calculate the subjective value of the lottery:

- For the 50% chance to win \$200:

$$v(200) = 200^{0.88} \approx 136.1$$

- Weighted probability:

$$w(0.5) \approx 0.5 \text{ (from above)}$$

5. Compute the overall subjective value of the lottery:

$$V_{\text{lottery}} = w(0.5) v(200) + (1 - w(0.5)) v(0) = 0.5 \cdot 136.1 + 0.5 \cdot 0 = 68.05$$

6. Compare to the sure gain:

$$v(100) \approx 75.9$$

Since $75.9 > 68.05$, the individual perceives the sure \$100 as more valuable than the lottery, aligning with risk aversion in gains.

Graphical Representation of Prospect Theory

Value Function Graph

The typical shape of the value function is an S-curve that is steeper for losses than for gains, illustrating loss aversion. It is concave for gains (diminishing returns) and convex for losses.

Probability Weighting Graph

The probability weighting function often shows an inverse S-shape, overweighting small probabilities and underweighting large ones. This explains behaviors like buying lottery tickets (overweighting small chances) or avoiding insurance (underweighting high probabilities of loss).

Applications of Prospect Theory and Mathematical Examples

Behavioral Economics and Finance

- Modeling investor behavior and market anomalies
- Understanding how people value potential gains and losses

Decision-Making in Business and Policy

- Designing better risk communication strategies
- Developing policies that account for human biases

Conclusion

Kahneman and Tversky's prospect theory revolutionized our understanding of decision-making under risk by incorporating psychological insights into a mathematical framework. The core components—value function and probability weighting—are expressed through specific equations that can be applied to real-world scenarios. The example provided illustrates how to quantitatively assess choices, revealing why individuals often deviate from classical rational models. Their work continues to influence diverse fields, emphasizing the importance of accounting for human biases in decision-making models.

References and Further Reading

- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*.
- Kahneman, D. (2011). *Thinking, Fast and Slow*. Farrar, Straus & Giroux.
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions About Health, Wealth, and Happiness*.

For detailed mathematical derivations and more complex examples, downloading the relevant PDF files on prospect theory math examples can provide additional insights and practice problems, aiding in mastering the application of this influential theory.

Frequently Asked Questions

What is the core idea behind Kahneman and Tversky's Prospect Theory as explained in their

math examples?

Kahneman and Tversky's Prospect Theory suggests that people value gains and losses differently, leading to decision-making that deviates from expected utility theory. Their math examples illustrate how individuals overweight small probabilities and exhibit loss aversion, influencing choices under risk.

How does the math example in the PDF illustrate the concept of loss aversion in Prospect Theory?

The math example shows that the subjective value of potential losses weighs more heavily than equivalent gains, demonstrating that people tend to prefer avoiding losses over acquiring similar-sized gains, which is a key aspect of loss aversion modeled mathematically in the theory.

What equations are commonly used in the Prospect Theory PDF examples to represent value and weighting functions?

The main equations include the value function $v(x)$, which is typically concave for gains and convex for losses, often modeled as $v(x) = x^\alpha$ for gains and $-\lambda(-x)^\beta$ for losses, and the probability weighting function $w(p)$, which captures how people overweight small probabilities and underweight large ones, often represented as $w(p) = p^\gamma / (p^\gamma + (1 - p)^\gamma)^{1/\gamma}$.

Can you explain the significance of the 'value function' in the Prospect Theory math examples from the PDF?

The value function quantifies how individuals perceive gains and losses relative to a reference point. It is typically S-shaped—concave for gains, convex for losses—and steeper for losses, reflecting loss aversion. The math examples demonstrate how this function influences decision weights and choices under risk.

How do the math examples in the PDF demonstrate probability distortion in Prospect Theory?

The examples show how people tend to overweight small probabilities and underweight large probabilities using the probability weighting function $w(p)$. This distortion explains behaviors like gambling or insurance purchasing, where actual probabilities are perceived differently in decision calculations.

What are typical parameter values used in the Prospect Theory math examples to fit experimental data?

Parameters such as α and β (often around 0.88) for the value function, λ (around 2.25) for loss aversion, and γ (around 0.61) for probability weighting are commonly used. These values are derived from empirical data and help the math examples accurately model observed decision behaviors.

Where can I find a comprehensive PDF with Kahneman and Tversky's Prospect Theory math examples?

A highly recommended resource is Kahneman and Tversky's original papers, such as 'Prospect Theory: An Analysis of Decision under Risk,' which include detailed mathematical examples. Many academic websites and university courses also provide PDFs and lecture notes explaining the math behind Prospect Theory.

Additional Resources

Kahneman and Tversky Prospect Theory Math Example PDF: An In-Depth Exploration

In the realm of behavioral economics and decision-making psychology, few concepts have revolutionized traditional economic theories as profoundly as Prospect Theory. Developed by psychologists Daniel Kahneman and Amos Tversky in the late 1970s, this theory challenges the classical assumption that humans are rational actors who always make decisions to maximize utility. Instead, it posits that individuals often make choices

based on perceived gains and losses relative to a reference point, leading to systematic biases and deviations from expected utility maximization. For scholars, students, and practitioners alike, understanding the mathematical underpinnings of Prospect Theory is crucial. A comprehensive Kahneman and Tversky prospect theory math example PDF serves as an invaluable resource, illustrating how the theory translates into concrete calculations and real-world decision-making scenarios.

This article aims to unpack the core mathematical framework of Prospect Theory, explore its practical applications, and elucidate the significance of example PDFs that facilitate a deeper grasp of its concepts.

The Foundations of Prospect Theory: Moving Beyond Expected Utility

Before delving into the math, it's essential to understand why Prospect Theory was proposed as an alternative to traditional expected utility theory.

The Limitations of Expected Utility Theory

Under classical economic assumptions:

- Individuals are rational.
- They evaluate potential outcomes based on their expected utility.
- They make choices to maximize this utility.

However, empirical evidence shows that real-world decision-makers often violate these principles, especially when faced with risk and uncertainty. Common phenomena such as loss aversion, framing effects, and probability distortions reveal the limitations of classical models.

Enter Prospect Theory

Kahneman and Tversky's Prospect Theory addresses these shortcomings by:

- Introducing a value function that is defined over gains and losses relative to a reference point.
- Incorporating probability weighting, where individuals overweight small probabilities and underweight large ones.
- Explaining observed decision patterns that deviate from expected utility maximization.

Mathematical Components of Prospect Theory

At its core, Prospect Theory involves two primary mathematical

constructs:

1. Value Function (v): Defines how people value gains and losses.
2. Probability Weighting Function (w): Describes how individuals perceive probabilities.

Let's explore each in detail.

1. The Value Function

The value function captures how individuals perceive gains and losses differently—a phenomenon known as loss aversion. It is typically concave for gains, convex for losses, and steeper for losses than for gains.

Mathematically, the value function is often represented as:

$$v(x) = \begin{cases} x^\alpha & \text{if } x \geq 0 \\ -\lambda(-x)^\beta & \text{if } x < 0 \end{cases}$$

Where:

- x is the outcome relative to the reference point.
- (α, β) are parameters ($0 < \alpha, \beta \leq 1$) that shape the curvature of the value function for gains and losses.
- λ (> 1) captures loss aversion, indicating losses are felt more intensely than gains of equivalent size.

Interpretation:

- When $(\alpha = \beta = 1)$ and $(\lambda = 1)$, the value function reduces to a linear utility, aligning with classical models.
- Typically, $(\alpha, \beta < 1)$, reflecting diminishing sensitivity.
- $(\lambda > 1)$ indicates that losses are weighted more heavily than gains.

2. Probability Weighting Function

People tend to distort objective probabilities, overweighting small probabilities and underweighting large ones. The probability weighting function models this phenomenon.

A common functional form is:

$$w(p) = \frac{p^\gamma}{\left(p^\gamma + (1 - p)^\gamma \right)^{1/\gamma}}$$

Where:

- p is the objective probability.
- γ ($0 < \gamma \leq 1$) controls the curvature; lower γ indicates more distortion.

Key points:

- When $\gamma = 1$, $w(p) = p$, meaning probabilities are perceived objectively.
- When $\gamma < 1$, small probabilities are overweighted, and large ones are underweighted.

Constructing a Mathematical Example: Step-by-Step

To bring these concepts to life, a typical "math example PDF" might include a scenario illustrating how an individual evaluates risky options using Prospect Theory. Here's a simplified outline of such an example:

Scenario Setup

Suppose an individual faces two choices:

- Option A: A sure gain of \$100.
- Option B: A 50% chance to win \$200 and a 50% chance to win nothing.

Classical expected utility:

- Expected value of Option B = $0.5 \times \$200 + 0.5 \times \$0 = \$100$.

Expected utility models would predict indifference. However, Prospect Theory suggests the decision might differ due to probability weighting and loss aversion.

Step 1: Assign Parameters

Let's assume typical parameter values:

- $\alpha = \beta = 0.88$
- $\lambda = 2.25$
- $\gamma = 0.61$

Step 2: Calculate the Value of Gains

- For the sure gain:

$$v(\$100) = (100)^{0.88} \approx 100^{0.88}$$

$$v(\$100) \approx e^{0.88 \times \ln(100)}$$

$$\backslash (\ln(100) \approx 4.605 \backslash)$$

$$\backslash (v(\$100) \approx e^{\{0.88 \times 4.605\}} \approx e^{\{4.052\}} \approx 57.6 \backslash)$$

- For the gamble:

- The potential gain:

$$\backslash (v(\$200) = (200)^{\{0.88\}} \backslash)$$

$$\backslash (\ln(200) \approx 5.3 \backslash)$$

$$\backslash (v(\$200) \approx e^{\{0.88 \times 5.3\}} \approx e^{\{4.664\}} \approx 105.2 \backslash)$$

- The zero outcome:

$$\backslash (v(\$0) = 0 \backslash)$$

Step 3: Calculate Probabilities and Weights

- Objective probabilities:

$$\backslash (p_{\text{win}} = 0.5 \backslash)$$

- Weighting:

$$\backslash (w(0.5) = \frac{0.5^{\{0.61\}}}{\left(0.5^{\{0.61\}} + (1 - 0.5)^{\{0.61\}} \right)^{\{1/0.61\}}} \backslash)$$

$$\text{Since } \backslash (0.5^{\{0.61\}} = e^{\{0.61 \times \ln(0.5)\}} \backslash)$$

$$\backslash (\ln(0.5) \approx -0.693 \backslash)$$

$$\backslash (0.5^{\{0.61\}} \approx e^{\{-0.693 \times 0.61\}} \approx e^{\{-0.423\}} \approx 0.655 \backslash)$$

Sum:

$$\backslash (0.655 + 0.655 = 1.31 \backslash)$$

Denominator:

$$\backslash ((1.31)^{\{1/0.61\}} \backslash)$$

$$\backslash (1/0.61 \approx 1.639 \backslash)$$

$$\backslash ((1.31)^{\{1.639\}} \approx e^{\{1.639 \times \ln(1.31)\}} \backslash)$$

$$\backslash (\ln(1.31) \approx 0.27 \backslash)$$

$$\left(e^{1.639 \times 0.27} \approx e^{0.443} \approx 1.557 \right)$$

Weight:

$$\left(w(0.5) \approx 0.655 / 1.557 \approx 0.42 \right)$$

Step 4: Calculate the Overall Prospect Value

- For the gain:

$$\left(\text{Weighted value} = w(0.5) \times v(\$200) \approx 0.42 \times 105.2 \approx 44.2 \right)$$

- For the zero outcome:

$$\left(v(\$0) = 0 \right)$$

- Total value of the gamble:

$$\left(V_{\text{gamble}} = 44.2 + (w(1 - 0.5) \times v(\$0)) \right)$$

Since $(1 - 0.5 = 0.5)$, and the same calculations apply:

$$\left(w(0.5) \approx 0.42 \right)$$

$$\left(V_{\text{gamble}} = 44.2 + 0.42 \times 0 = 44.2 \right)$$

- For the sure gain:

$$\left(V_{\text{sure}} = v(\$100) \approx 57.6 \right)$$

Step 5: Decision Implication

- The individual perceives the sure gain as worth approximately 57.6 units.

- The gamble's perceived value is approximately 44.2 units.

- Conclusion: The person would prefer the sure \$100 over the risky gamble, aligning with risk aversion in gains.

Significance of Prospect Theory Math Examples PDFs

PDF documents containing detailed mathematical examples serve multiple functions:

- Educational Clarity: Step-by-step calculations help students and researchers understand how theoretical parameters translate into decision-making behavior.

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Kahneman And Tversky Prospect Theory Math Example Pdf

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Ben Orlin, 2018-09-18 A hilarious reeducation in mathematics-full of joy, jokes, and stick figures-that sheds light on the countless practical and wonderful ways that math structures and shapes our world. In *Math With Bad Drawings*, Ben Orlin reveals to us what math actually is; its myriad uses, its strange symbols, and the wild leaps of logic and faith that define the usually impenetrable work of the mathematician. Truth and knowledge come in multiple forms: colorful drawings, encouraging jokes, and the stories and insights of an empathetic teacher who believes that math should belong to everyone. Orlin shows us how to think like a mathematician by teaching us a brand-new game of tic-tac-toe, how to understand an economic crises by rolling a pair of dice, and the mathematical headache that ensues when attempting to build a spherical Death Star. Every discussion in the book is illustrated with Orlin's trademark bad drawings, which convey his message and insights with perfect pitch and clarity. With 24 chapters covering topics from the electoral college to human genetics to the reasons not to trust statistics, *Math with Bad Drawings* is a life-changing book for the math-estranged and math-enamored alike.

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kahneman and tversky prospect theory math example pdf: Algorithmic Game Theory Spyros Kontogiannis, 2010 Annotation. This book constitutes the refereed proceedings of the Third International Symposium on Algorithmic Game Theory, SAGT 2010, held in Athens, Greece, in October 2010. The 28 revised full papers presented together with 2 invited lectures were carefully reviewed and selected from 61 submissions. The papers are intended to cover all important areas such as solution concepts, game classes, computation of equilibria and market equilibria, convergence and learning in games, complexity classes in game theory, algorithmic aspects of fixed-point theorems, mechanisms, incentives and coalitions, cost-sharing algorithms, computational problems in economics, finance, decision theory and pricing, computational social choice, auction algorithms, price of anarchy and its relatives, representations of games and their complexity, network formation on the internet, congestion, routing and network design and formation games, game-theoretic approaches to networking problems, and computational social choice.

kahneman and tversky prospect theory math example pdf: Alternative Approaches to Economic Theory Victor A. Beker, 2019-06-11 The 2007–2008 financial crisis exposed the shortcomings of mainstream economic theory with economists unprepared to deal with it. In the face of this, a major rethinking of economics seems necessary and in presenting alternative approaches to economic theory, this book contributes to the rebuilding of the discipline. This volume brings together contributions from different perspectives and theoretical approaches that address the challenge of updating the economic theory corpus and seek to recover prestige for this discipline after the failure of neoclassical economics. It addresses a range of topics, including the complexity approach to economics, category theory,

the Post-Keynesian approach to micro and macroeconomics, financialisation, multidimensional analysis and ecological economics. The book is aimed at economics scholars, researchers, academics and practitioners, as well as upper undergraduates and graduates in this area of knowledge. It may also be of interest for people interested in methodological issues in economics and the relationship between economic theory and the real world.

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Economy and Production Denis B. Solovev, 2019-04-10 This book presents the Proceedings of The International Science and Technology Conference "FarEastCon-2018," which took place on October 2-4, 2018 in Vladivostok, Russian Federation. The conference provided a platform for accumulating expert opinion on projects and initiatives aimed at the implementation of far-sighted scientific research and development, and allowed current scientific and practical achievements to be shared with wide circle of researchers. Featuring selected papers from the conference, the book is of interest to a broad range of experts involved in developing innovative solutions and organizing events that increase the efficiency of economic and innovative activities.

kahneman and tversky prospect theory math example pdf: Multi-valued Logic for Decision-Making Under Uncertainty

Evgeny Kagan, Alexander Rybalov, Ronald Yager, 2025-02-17 Multi-valued and fuzzy logics provide mathematical and computational tools for handling imperfect information and decision-making with rational collective reasoning and irrational individual judgements. The suggested implementation of multi-valued logics is based on the uninorm and absorbing norm with generating functions defined by probability distributions. Natural extensions of these logics result in non-commutative and non-distributive logics. In addition to Boolean truth values, these logics handle subjective truth and false values and model irrational decisions. Dynamics of decision-making are specified by the subjective Markov process and learning – by neural network with extended Tsetlin neurons. Application of the suggested methods is illustrated by modelling of irrational economic decisions and biased reasoning in the wisdom-of-the-crowd method, and by control of mobile robots and navigation of their groups. Topics and features: Bridges the gap between fuzzy and probability methods Includes examples in the field of machine-learning and robots' control Defines formal models of subjective judgements and decision-making Presents practical techniques for solving non-probabilistic decision-making problems Initiates further research in non-commutative and non-distributive logics The book forms a basis for theoretical studies and practice of decision-making under uncertainty and will be useful for computer scientists and mathematicians interested in multi-valued and fuzzy logic, as well as for engineers working in the field of data mining and data analysis.

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James Ming Chen, 2016-10-01 This book explains how investor behavior, from mental accounting to the combustible interplay of hope and fear, affects financial economics. The transformation of portfolio theory begins with the identification of anomalies. Gaps in perception and behavioral departures from rationality spur momentum, irrational exuberance, and speculative bubbles. Behavioral accounting undermines the rational premises of mathematical finance. Assets and portfolios are imbued with "affect." Positive and negative emotions warp investment decisions. Whether hedging against intertemporal changes in their ability to bear risk or climbing a psychological hierarchy of needs, investors arrange their portfolios and financial affairs according to emotions and perceptions. Risk aversion and life-cycle theories of consumption provide possible solutions to the equity premium puzzle, an iconic financial mystery. Prospect theory has questioned the cogency of the efficient capital markets hypothesis. Behavioral portfolio theory arises from a psychological account of security, potential, and aspiration.

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to Dismantle a Financial Bomb David Orrell, 2022-02-10 Money has many apparently magical properties. It can be created out of the void - and vanish without so much as a puff of smoke. It can flash through space. It can grow without limit. And it can blow up without warning. David Orrell argues that the emerging discipline of quantum economics, of which he is at the forefront, is the key to shattering the illusions that prevent us from understanding money's true nature. In this colourful tour of the history, philosophy and mathematics of money, Orrell demonstrates how everything makes much more sense when we replace our classical economic models with ones based on quantum probability - and reveals the explosive reality of what is left once the illusions are stripped away.

kahneman and tversky prospect theory math example pdf: *The Structure of Style* Shlomo Argamon, Kevin Burns, Shlomo Dubnov, 2010-09-13 Style is a fundamental and ubiquitous aspect of the human experience: Everyone instantly and constantly assesses people and things according to their individual styles, academics establish careers by researching musical, artistic, or architectural styles, and entire industries maintain themselves by continuously creating and marketing new styles. Yet what exactly style is and how it works are elusive: We certainly know it when we see it, but there is no shared and clear understanding of the diverse phenomena that we call style. The Structure of Style explores this issue from a computational viewpoint, in terms of how information is represented, organized, and transformed in the production and perception of different styles. New computational techniques are now making it possible to model the role of style in the creation of and response to human artifacts—and therefore to develop software systems that directly make use of style in useful ways. Argamon, Burns, and Dubnov organize the research they have collected in this book according to the three roles that computation can play in stylistics. The first section of the book, Production, provides conceptual foundations by describing computer systems that create artifacts—musical pieces, texts, artworks—in different styles. The second section, Perception, explains methods for analyzing different styles and gleaning useful information, viewing style as a form of communication. The final section, Interaction, deals with reciprocal interaction between style producers and perceivers, in areas such as interactive media, improvised musical accompaniment, and game playing. The Structure of Style is written for researchers and practitioners in areas including information retrieval, computer art and music, digital humanities, computational linguistics, and artificial intelligence, who can all benefit from this comprehensive overview and in-depth description of current research in this active interdisciplinary field.

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scholars of a number of disciplines.

kahneman and tversky prospect theory math example pdf: *Principal Component Analysis and Randomness Test for Big Data Analysis* Mieko Tanaka-Yamawaki, Yumihiko Ikura, 2023-05-23 This book presents the novel approach of analyzing large-sized rectangular-shaped numerical data (so-called big data). The essence of this approach is to grasp the meaning of the data instantly, without getting into the details of individual data. Unlike conventional approaches of principal component analysis, randomness tests, and visualization methods, the authors' approach has the benefits of universality and simplicity of data analysis, regardless of data types, structures, or specific field of science. First, mathematical preparation is described. The RMT-PCA and the RMT-test utilize the cross-correlation matrix of time series, $C = XX^T$, where X represents a rectangular matrix of N rows and L columns and X^T represents the transverse matrix of X . Because C is symmetric, namely, $C = C^T$, it can be converted to a diagonal matrix of eigenvalues by a similarity transformation $SCS^{-1} = SCST$ using an orthogonal matrix S . When N is significantly large, the histogram of the eigenvalue distribution can be compared to the theoretical formula derived in the context of the random matrix theory (RMT, in abbreviation). Then the RMT-PCA applied to high-frequency stock prices in Japanese and American markets is dealt with. This approach proves its effectiveness in extracting trendy business sectors of the financial market over the prescribed time scale. In this case, X consists of N stock- prices of length L , and the correlation matrix C is an N by N square matrix, whose element at the i -th row and j -th column is the inner product of the price time series of the length L of the i -th stock and the j -th stock of the equal length L . Next, the RMT-test is applied to measure randomness of various random number generators, including algorithmically generated random numbers and physically generated random numbers. The book concludes by demonstrating two applications of the RMT-test: (1) a comparison of hash functions, and (2) stock prediction by means of randomness, including a new index of off-randomness related to market decline.

kahneman and tversky prospect theory math example pdf: *Risk and Reliability Analysis: Theory and Applications* Paolo Gardoni, 2017-02-24 This book presents a unique collection of contributions from some of the foremost scholars in the field of risk and reliability analysis. Combining the most advanced analysis techniques with practical applications, it is one of the most comprehensive and up-to-date books available on risk-based engineering. All the fundamental concepts needed to conduct risk and reliability assessments are covered in detail, providing readers with a sound understanding of the field and making the book a powerful tool for students and researchers alike. This book was prepared in honor of Professor Armen Der Kiureghian, one of the fathers of modern risk and reliability analysis.

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kahneman and tversky prospect theory math example pdf: *Acts of God and Man* Michael Powers, 2014-01-01 Much has been written about the ups and downs of financial markets, from the lure of prosperity to the despair of crises. Yet a more fundamental and pernicious source of uncertainty exists in today's world: the traditional "insurance" risks of earthquakes, storms, terrorist attacks, and other disasters. Insightfully exploring these acts of God and man, Michael R. Powers guides readers through the methods available for identifying and measuring such risks, financing their consequences, and forecasting their future behavior within the limits of science. A distinctive characteristic of earthquakes, hurricanes, bombings, and other insurance risks is that they impact the values of stocks, bonds, commodities, and other market-based financial products, while remaining largely unaffected by or "aloof" from the behavior of markets. Quantifying such risks given limited data is difficult yet crucial for

achieving the financing objectives of insurance. Powers begins with a discussion of how risk impacts our lives, health, and possessions and proceeds to introduce the statistical techniques necessary for analyzing these uncertainties. He then considers the experience of risk from the perspectives of both policyholders and insurance companies, and compares their respective responses. The risks inherent in the private insurance industry lead naturally to a discussion of the government's role as both market regulator and potential insurer of last resort. Following a thoughtful and balanced analysis of these issues, Powers concludes with an interdisciplinary investigation into the nature of uncertainty, incorporating ideas from physics, philosophy, and game theory to assess science's limitations in predicting the ramifications of risk.

kahneman and tversky prospect theory math example pdf: Value of Information and Flexibility

Martin J. Vilela, Gbenga F. Oluyemi, 2021-10-21 This book presents a consistent methodology for making decisions under uncertain conditions, as is almost always the case. Tools such as value of information and value of flexibility are explored as a means to make more complex and nuanced decisions. The book develops the complete formalism for assessing the value of acquiring information with two novel approaches. Firstly, it integrates the fuzzy characteristics of data, and secondly develops a methodology for assessing data acquisition actions that optimize the value of projects from a holistic perspective. The book also discusses the formalism for including flexibility in the project decision assessment. Practical examples of oil- and gas-related decision problems are included and discussed to facilitate the learning process. This book provides valuable advice and case studies applicable to engineers, researchers, and graduate students, particularly in the oil and gas industry and pharmaceutical industry.

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