

Instructor: Minh Kha

1. Find the domain of the function $f(x) = \frac{e^x}{\sqrt{x^2-1}} + \ln(x-1)$.

$$\begin{aligned} x^2 - 1 &> 0 & \text{and} & & x - 1 > 0 \\ x^2 &> 1 & \text{and} & & x > 1 \\ \text{Domain:} & & & & (1, \infty) \end{aligned}$$

2. The producer is not willing to sell any item if the price is set at \$10. However, the producer will supply 5 items when the price is set at \$20. Find the supply equation.

$$\begin{aligned} p &= S(x) = cx + d \\ p = 10 &: x = 0 \\ p = 20 &: x = 5 \end{aligned}$$

$$\Rightarrow c \cdot 0 + d = 10 \Rightarrow d = 10$$

$$\Rightarrow 5c + d = 20$$

$$5c + 10 = 20 \rightarrow 5c = 10 \Rightarrow c = 2$$

$$\boxed{S(x) = 2x + 10}$$

$$\begin{aligned} \text{Note} \\ p = 0(x) = -cx + d \\ c > 0 \end{aligned}$$

3. Solve the equation

$$\bullet 5^x = 25^{x+2}$$

$$5^x = 5^{2(x+2)}$$

$$x = 2(x+2)$$

$$x = 2x + 4$$

$$\rightarrow \boxed{x = -4}$$

$$\bullet 2xe^x = x^2e^x + e^x$$

$$2x\cancel{e^x} = (x^2+1)\cancel{e^x} \quad (\text{since } e^x > 0)$$

$$2x = x^2 + 1$$

$$x^2 + 1 - 2x = 0 \quad (\Leftrightarrow) \quad (x-1)^2 = 0 \quad (\Leftrightarrow) \quad \boxed{x=1}$$

4. What amount will an account have after 10 years if \$1000 is invested at an annual rate of 10% compounded continuously?

$$F = 1000 * e^{0.1 * 10} = 2718$$

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Shasha Hu



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Table of Contents Asu Math 142 Finance Final Exam

1. Understanding the eBook Asu Math 142 Finance Final Exam
 - The Rise of Digital Reading Asu Math 142 Finance Final Exam
 - Advantages of eBooks Over Traditional Books
2. Identifying Asu Math 142 Finance Final Exam
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Asu Math 142 Finance Final Exam
 - User-Friendly Interface
4. Exploring eBook Recommendations from Asu Math 142 Finance Final Exam
 - Personalized Recommendations
 - Asu Math 142 Finance Final Exam User Reviews and Ratings
 - Asu Math 142 Finance Final Exam and Bestseller Lists

5. Accessing Asu Math 142 Finance Final Exam Free and Paid eBooks
 - Asu Math 142 Finance Final Exam Public Domain eBooks
 - Asu Math 142 Finance Final Exam eBook Subscription Services
 - Asu Math 142 Finance Final Exam Budget-Friendly Options
6. Navigating Asu Math 142 Finance Final Exam eBook Formats
 - ePub, PDF, MOBI, and More
 - Asu Math 142 Finance Final Exam Compatibility with Devices
 - Asu Math 142 Finance Final Exam Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Asu Math 142 Finance Final Exam
 - Highlighting and Note-Taking Asu Math 142 Finance Final Exam
 - Interactive Elements Asu Math 142 Finance Final Exam
8. Staying Engaged with Asu Math 142 Finance Final Exam
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Asu Math 142 Finance Final Exam
9. Balancing eBooks and Physical Books Asu Math 142 Finance Final Exam
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Asu Math 142 Finance Final Exam
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Asu Math 142 Finance Final Exam
 - Setting Reading Goals Asu Math 142 Finance Final Exam
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Asu Math 142 Finance Final Exam
 - Fact-Checking eBook Content of Asu Math 142 Finance Final Exam
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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