Math 122: Test 1 Review
Instructions: Read each question below and decide which choice (a, b, c, or d) best answers the question. Circle the letter corresponding to your choice of the best answer. Each problem is worth 6 points. If you choose the correct answer, you will receive 6 points for the problem. If you choose an incorrect answer, you will receive 0 points for the problem. If you leave a problem blank (that is, if you do not circle a letter), then you will receive 1.5 points for the problem. It is up to you to make sure that your choice for an answer or lack thereof is clear. If I have to guess at what you mean (for example, if you circle or leave marks around two letters in the same problem), then you will be given 0 points for the problem.
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Scoring:

16 questions (multiple choice, 4 choices each)
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer
**Scoring:**

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6 points for a correct answer  
0 points for an incorrect answer  
1.5 points for no answer
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Results of Answering All Questions Right:
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Results of Answering All Questions Right:

$16 \times 6$
Scoring:

16 questions (multiple choice, 4 choices each)
  6 points for a correct answer
  0 points for an incorrect answer
  1.5 points for no answer

Results of Answering All Questions Right:

\[ 16 \times 6 + 4 \]

↑

free
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Results of Answering All Questions Right:

\[ 16 \times 6 + 4 = 100 \text{ points} \]
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Results of Answering All Questions Right: 100 pts

\[ 16 \times 6 + 4 = 100 \text{ points} \]

↑
free
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Results of Answering All Questions Right: 100 pts
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Results of Answering All Questions Right: 100 pts

Results of Turning in a Blank Test:

\[16 \times 1.5 + 4 = 28\] points

\[\uparrow\]

free
Scoring:

16 questions (multiple choice, 4 choices each)
  6 points for a correct answer
  0 points for an incorrect answer
  1.5 points for no answer

Results of Answering All Questions Right: 100 pts

Results of Turning in a Blank Test: 28 pts
Scoring:

- 16 questions (multiple choice, 4 choices each)
- 6 points for a correct answer
- 0 points for an incorrect answer
- 1.5 points for no answer

Results of Answering All Questions Right: 100 pts

Results of Turning in a Blank Test: 28 pts

Likely Results of Guessing:
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Likely Results of Guessing:
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Likely Results of Guessing:

\[ 4 \times 6 + 4 = 28 \text{ points} \]

↑
free
Scoring:

16 questions (multiple choice, 4 choices each)
6 points for a correct answer
0 points for an incorrect answer
1.5 points for no answer

Likely Results of Guessing:

\[ 4 \times 6 + 4 = 28 \text{ points} \]
\[ \uparrow \quad \uparrow \]
free
likely correct
Scoring:

- 16 questions (multiple choice, 4 choices each)
- 6 points for a correct answer
- 0 points for an incorrect answer
- 1.5 points for no answer

Results of Answering All Questions Right: 100 pts

Results of Turning in a Blank Test: 28 pts

Likely Results of Guessing: 28 pts
Comments and Suggestions:

- Guessing could lower or raise your grade.
Comments and Suggestions:

- Guessing could lower or raise your grade. (Duh!)
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- Guessing could lower or raise your grade. (Duh!)
- If you can eliminate a choice, it is probably a good idea to answer the question (and not skip it).
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- Guessing could lower or raise your grade. (Duh!)
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- A calculator is not “necessary,” but you may want to use it to compare your answer with the choices.
Comments and Suggestions:

- Guessing could lower or raise your grade. (Duh!)
- If you can eliminate a choice, it is probably a good idea to answer the question (and not skip it).
- A calculator is not “necessary,” but you may want to use it to compare your answer with the choices.
- The problems are not in the order you might think.
Comments and Suggestions:

- Guessing could lower or raise your grade. (Duh!)
- If you can eliminate a choice, it is probably a good idea to answer the question (and not skip it).
- A calculator is not “necessary,” but you may want to use it to compare your answer with the choices.
- The problems are not in the order you might think.
- Organize yourself before Friday (terms, formulas, etc.).
Material to Study:

- lines (and slopes)
- power functions
- cost, revenue, & profit
- break-even point
- rate of change
- increasing, decreasing
- growth & decay
- growth & decay rate
- interest
- compounded annually
- logarithms
- velocity
- getting info from graphs & tables
- writing equations from given info
- marginal cost, revenue, & profit
- horizontal & vertical intercepts
- average rate of change
- concave up, concave down
- exponential growth & decay
- exponential growth & decay rate
- continuous growth & decay (rate)
- compounded continuously
- composition of functions
- solving exponential equations
Problem 1:

Let \( W = f(t) \) represent wheat production in Argentina, in millions of metric tons, where \( t \) is in years since 1990. Interpret the statement \( f(9) = 14 \) in terms of wheat production.
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In 1999, Argentina produced 14 million metric tons of wheat.
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In 1999, Argentina produced 14 million metric tons of wheat.
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*Pepsico sales in millions of dollars*
### Problem 4:

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*Pepsico sales in millions of dollars*

a) Find the change in sales between 1991 and 1993.
**Problem 4:**

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*Pepsico sales in millions of dollars*

a) Find the change in sales between 1991 and 1993.

\[ 25021 - 19608 \]
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_Pepsico sales in millions of dollars_

a) Find the change in sales between 1991 and 1993.

\[ 25021 - 19608 = 5413 \]
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*Pepsico sales in millions of dollars*

a) Find the change in sales between 1991 and 1993.

\[
25021 - 19608 = 5413
\]

\[
\$5,413,000,000
\]
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*Pepsico sales in millions of dollars*

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.
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\[ 25021 - 19608 = 5413 \]
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*Pepsico sales in millions of dollars*

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.

\[
\frac{25021 - 19608}{2} = 5413
\]

2

5413
Problem 4:

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_Pepsico sales in millions of dollars_

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.

\[
\frac{25021 - 19608}{2} = \frac{5413}{2} = 2706.5
\]
Problem 4:

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*Pepsico sales in millions of dollars*

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.

\[ \frac{25021 - 19608}{2} = \frac{5413}{2} = 2706.5 \]
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**Pepsico sales in millions of dollars**

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.

\[
25021 - 19608 = 5413
\]

\[
\frac{5413}{2} = 2706.5
\]

2,706,500,000 dollars per year
Problem 4:

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*Pepsico sales in millions of dollars*

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.

\[2,706,500,000 \text{ dollars per year}\]
### Problem 4:

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*Pepsico sales in millions of dollars*

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.

2,706,500,000 dollars per year
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*Pepsico sales in millions of dollars*

b) Find the average rate of change in sales between 1991 and 1993. Give units and interpret your answer.

2,706,500,000 dollars per year

Pepsico made an average of $2,706,500,000 per year in sales between 1991 and 1993.
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 3% per year?
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The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 3% per year?

$$G = P(1+r)^t$$
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 3% per year?

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Problem 12:

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$$G = 6 (1 + r)^t$$
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$$G = 6 (1 + r)^t$$
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 3% per year?

$$G = 6 \left(1 + 0.03\right)^t$$
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 3% per year?

$$G = 6 \times (1.03)^t$$
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 0.2 billion dollars per year?
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The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 0.2 billion dollars per year?

$$G = mt + b$$
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$$G = mt + b$$
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 0.2 billion dollars per year?

$$G = mt + 6$$
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 0.2 billion dollars per year?

\[ G = m \cdot t + 6 \]
Problem 12:

The gross national product, $G$, of Iceland was 6 billion dollars in 1998. Give a formula for $G$ (in billions of dollars) $t$ years after 1998 if $G$ increases by 0.2 billion dollars per year?

$$G = 0.2t + 6$$
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by $4$ per day?
Problem 13:

A product costs $80 today. How much will the product cost in \( t \) days if the price is reduced by $4 per day?

\[ C = m \ t + b \]
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A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by $4$ per day?

$$C = m \ t + b$$
Problem 13:

A product costs $80 today. How much will the product cost in \( t \) days if the price is reduced by $4 per day?

\[ C = m \ t + 80 \]
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$$C = m \ t + 80$$
Problem 13:

A product costs $80 today. How much will the product cost in \( t \) days if the price is reduced by $4 per day?

\[
C = m \ t + 80
\]
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by $4$ per day?

$$C = -4t + 80$$
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by $4$ per day?

\[ C = -4t + 80 \]

$-4t + 80$ dollars
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?

\[ C = P \ (1+r)^t \]
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?

$$C = P \ (1+r)^t$$
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?

\[ C = 80(1+r)^t \]
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?

\[ C = 80(1+r)^t \]
Problem 13:

A product costs $80 today. How much will the product cost in \( t \) days if the price is reduced by 5% per day?

\[
C = 80(1+0.05)^t
\]
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?

\[ C = 80(1 + 0.05)^t \]
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?

$$C = 80 (1 - 0.05)^t$$
Problem 13:

A product costs $80 today. How much will the product cost in $t$ days if the price is reduced by 5% per day?

\[ C = 80(1 - 0.05)^t \]

\[ 80(0.95)^t \text{ dollars} \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*straight-line depreciation*
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

\textit{the value is a linear function of time}
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = mt + b \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = mt + b \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = mt + 950 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = m t + 950 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = mt + 950 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = mt + 950 \]

\[ \uparrow \]

7
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

the value is a linear function of time

\[ V = m t + 950 \]

\[ \uparrow \]

\[ 7 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = m t + 950 \]

\[ \uparrow \]

\[ 7 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = m t + 950 \]

\[ \uparrow \quad \uparrow \]

\[ 0 \quad 7 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ V = m t + 950 \]

↑  ↑
0    7
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

The value is a linear function of time

\[ 0 = m \cdot 7 + 950 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ 0 = m \cdot 7 + 950 \]

\[ 7m = -950 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[
0 = m \cdot 7 + 950
\]

\[
7m = -950
\]

\[
m = -\frac{950}{7}
\]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[
0 = m \cdot 7 + 950
\]
\[
7m = -950
\]
\[
m = -\frac{950}{7} = -135.714\ldots
\]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[
V = mt + 950
\]

\[
m = \frac{-950}{7} = -135.714 \ldots
\]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ m = -\frac{950}{7} = -135.714 \ldots \]

\[ V = mt + 950 \]
Problem 17:

If a $950 refrigerator depreciates completely in seven years, find a formula for its value as a function of time.

*the value is a linear function of time*

\[ m = -\frac{950}{7} = -135.714 \ldots \]

\[ V = \left( -\frac{950}{7} \right) t + 950 \]
Problem 27:

\[ 20 = 50(1.04)^x \]
Problem 27:

\[ 20 = 50(1.04)^x \]

\[(1.04)^x = \frac{20}{50} \]
Problem 27:

\[ 20 = 50(1.04)^x \]

\[ (1.04)^x = \frac{2}{5} \]
Problem 27:

\[ 20 = 50(1.04)^x \]

\[ (1.04)^x = \frac{2}{5} \]
Problem 27:

\[ 20 = 50(1.04)^x \]

\[ (1.04)^x = \frac{2}{5} \]

\[ x \ln(1.04) = \ln\left(\frac{2}{5}\right) \]
Problem 27:

\[ 20 = 50(1.04)^x \]

\[ (1.04)^x = \frac{2}{5} \]

\[ x \ln(1.04) = \ln(\frac{2}{5}) \]

\[ x = \frac{\ln(\frac{2}{5})}{\ln(1.04)} \]
Problem 27:

\[ 20 = 50(1.04)^x \]

\[ (1.04)^x = \frac{2}{5} \]

\[ x \ln(1.04) = \ln(2/5) \]

\[ x = \frac{\ln(2/5)}{\ln(1.04)} = -23.3624\ldots \]
Problem 27:

\[ 20 = 50(1.04)^x \]

\[ (1.04)^x = \frac{2}{5} \]

\[ x \ln(1.04) = \ln\left(\frac{2}{5}\right) \]

\[ x = \frac{\ln\left(\frac{2}{5}\right)}{\ln(1.04)} = \frac{\ln(0.4)}{\ln(1.04)} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.
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If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]

\[ A = \text{amount after } t \text{ years} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]

\[ A = \text{amount after } t \text{ years} \]

\[ = P e^{r t} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]

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\[ = P e^{rt} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]

\[ A = \text{amount after } t \text{ years} \]

\[ = Pe^{0.1t} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]

\[ A = \text{amount after } t \text{ years} \]

\[ = P e^{0.1t} \]

\[ 20000 = P e^{0.1t} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]

\[ A = \text{amount after } t \text{ years} \]

\[ \quad = Pe^{0.1t} \]

\[ 20000 = Pe^{0.1t} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

$$P = \text{original deposit} = ?$$

$$A = \text{amount after } t \text{ years}$$

$$= P e^{0.1t}$$

$$20000 = P e^{0.1t}$$
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ P = \text{original deposit} = ? \]

\[ A = \text{amount after } t \text{ years} \]

\[ = P e^{0.1 t} \]

\[ 20000 = P e^{0.1 t} = P e^{0.6} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ 20000 = P e^{0.1 \cdot 6} = P e^{0.6} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ 20000 = P e^{0.1t} = P e^{0.6} \]

\[ P = \frac{20000}{e^{0.6}} \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

\[ 20000 = Pe^{0.1t} = Pe^{0.6} \]

\[ P = \frac{20000}{e^{0.6}} = 10976.2327 \ldots \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10\%, compounded continuously.

\[ 20000 = Pe^{0.1t} = Pe^{0.6} \]

\[ P = \frac{20000}{e^{0.6}} = 10976.2327\ldots \]
Problem 30:

If you need $20,000 in your bank account in 6 years, how much must be deposited now? The interest rate is 10%, compounded continuously.

$$20000 = Pe^{0.1t} = Pe^{0.6}$$

$$P = \frac{20000}{e^{0.6}} = 10976.2327\ldots$$

$10,976.24$
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

\[ P = \text{original deposit} \]
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

\[ P = \text{original deposit} \]

\[ A = \text{amount after } t \text{ years} \]
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

\[ P = \text{original deposit} \]

\[ A = \text{amount after } t \text{ years} \]
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

\[ P = \text{original deposit} \]

\[ A = \text{amount after } t \text{ years} \]

\[ = Pe^{0.06t} \]
Problem 31:

If a bank pays 6\% per year interest compounded continuously, how long does it take for the balance in an account to double?

\[ P = \text{original deposit} \]

\[ A = \text{amount after } t \text{ years} \]

\[ = Pe^{0.06t} \]

When does \( Pe^{0.06t} = 2P \)?
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

When does $P e^{0.06t} = 2P$?
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

When does \( e^{0.06t} = 2 \)?
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

When does $e^{0.06t} = 2$?

$0.06t = \ln(2)$
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

When does \( e^{0.06t} = 2 \) ?

\[ 0.06t = \ln(2) \]

\[ t = \frac{\ln(2)}{0.06} \]
Problem 31:

If a bank pays 6% per year interest compounded continuously, how long does it take for the balance in an account to double?

When does \( e^{0.06t} = 2 \) ?

\[
0.06t = \ln(2)
\]

\[
t = \frac{\ln(2)}{0.06} = 11.55 \ldots \text{ (years)}
\]
Problem 37:

\[ f(x) = x^2 + 1 \quad \text{and} \quad g(x) = \ln x \]

\[ f(g(x)) = ? \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = ? \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad \text{and} \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]

\[ f(g(x)) = \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]

\[ f(g(x)) = \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]

\[ f(g(x)) = f(\ln x) \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]

\[ f(g(x)) = f(\ln x) = \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]

\[ f(g(x)) = f(\ln x) = (\ln x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = g(x)^2 + 1 = (\ln x)^2 + 1 \]

\[ f(g(x)) = f(\ln x) = (\ln x)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad \text{and} \quad g(x) = \ln x \]

\[ g(f(x)) = \ln f(x) = \ln(x^2 + 1) \]
\[ g(f(x)) = g(x^2 + 1) = \ln(x^2 + 1) \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(f(x)) = f(x)^2 + 1 = (x^2 + 1)^2 + 1 \]
\[ f(f(x)) = f(x^2 + 1) = (x^2 + 1)^2 + 1 \]
Problem 37:

\[ f(x) = x^2 + 1 \quad g(x) = \ln x \]

\[ f(g(x)) = (\ln x)^2 + 1 \]
\[ g(f(x)) = \ln(x^2 + 1) \]
\[ f(f(x)) = (x^2 + 1)^2 + 1 \]
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, $q$. 
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A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, $q$.

$$
C =
$$
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, \( q \).

\[ C = \]
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, $q$.

\[ C = 7000 \]
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, $q$.

\[ C = 7000 \]
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, \( q \).

\[
C = 7000 + 5q
\]
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, \( q \).

\[
C = 7000 + 5q \quad R = \]

Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, $q$.

\[
C = 7000 + 5q \quad R = \]
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, $q$.

\[ C = 7000 + 5q \quad R = 12q \]
Problem 43(a):

A company produces and sells shirts. The fixed costs are $7000 and the variable costs are $5 per shirt. Shirts are sold at $12 each. Find cost and revenue as functions of the quantity of shirts, $q$.

\[ C = 7000 + 5q \quad R = 12q \]