1. What is the complete solution to the inequality \(2x - 7 > 13?\)
   A. \(x < -3\) or \(x > 10\)  
   B. \(x < -10\) or \(x > 10\)  
   C. \(x < -10\) or \(x > 3\)  
   D. No solution

2. The school store sells pens for $0.35 each and pencils for $0.15 each. Anthony spent $2.80 to buy a total of 12 pens and pencils. How many pens did Anthony buy?
   A. 4  
   B. 5  
   C. 6  
   D. 7

3. Solve the following system for \(y\).
   \[2x + y = 4\]
   \[3x - \frac{1}{2}y = -4\]
   A. \(y = -2x + 4\)  
   B. \(y = -10x\)  
   C. \(y = -2\)  
   D. \(y = 5\)

4. Which system of linear inequalities is represented by this graph?
   ![Graph](image)
   A. \(y > -2x + 2\) and \(y > \frac{1}{2}x + 2\)  
   B. \(y < -2x + 2\) and \(y > \frac{1}{2}x + 2\)  
   C. \(y > -2x + 2\) and \(y < \frac{1}{2}x + 2\)  
   D. \(y < -2x + 2\) and \(y < \frac{1}{2}x + 2\)

5. Which of the following shows the correct first step in using the substitution method to solve the system of equations below?
   \[x = y + 2\]
   \[3x + 5y = 11\]
   A. \(y + 2 = y + 2\)  
   B. \(y + 2 + 5y = 11\)  
   C. \(3y + 2 + 5y = 11\)  
   D. \(3(y + 2) + 5y = 11\)
6. Which of the following graphs best represents the system of equations?

\[ \begin{align*}
2y &= 4x - 8 \\
3x + 2y &= 6
\end{align*} \]

A. [Graph A]  
B. [Graph B]  
C. [Graph C]  
D. [Graph D]

7. Which expression is equivalent to \((9x^2 + 5)(9x - 5)\)?

A. \(81x^2 - 25\)  
B. \(81x^3 - 25\)  
C. \(81x^3 - 45x^2 + 45x - \frac{25}{25}\)  
D. \(81x^3 + 90x^2 + 45x - \frac{25}{25}\)
8. Perform the operation.

\[(5x^4 + 3x^2 + 8) \div (x^2 + 2x - 1)\]

\(\text{A. } 5x^2 - 10x + 28 + \frac{-66x + 36}{x^2 + 2x - 1}\)
\(\text{B. } 5x^2 - 7 + \frac{27x - 7}{x^2 + 2x - 1}\)
\(\text{C. } 5x^2 + 10x + 18 + \frac{26 - 10}{x^2 + 2x - 1}\)
\(\text{D. } 5x^3 + 5x^2 + 8x + \frac{16}{x^2 + 2x - 1}\)

9. \((-3x^3 + 2x^2 - x + 4) - 4(4x^3 - x + 1)\)

\(\text{A. } -19x^3 + 2x^2 + 3x\)
\(\text{B. } -19x^3 + 2x^2 - 2x + 5\)
\(\text{C. } -19x^3 + 2x^2 + 3x + 8\)
\(\text{D. } -19x^3 + 2x^2 - 5x + 8\)

10. What is the product of \(3x^2 + 4x - 7\) and \(x^2 - 3x + 8\)?

\(\text{A. } 2x^2 + 7x - 15\)
\(\text{B. } 4x^2 + x + 1\)
\(\text{C. } 3x^4 - 12x^2 - 56\)
\(\text{D. } 3x^4 - 5x^3 + 5x^2 + 53x - 56\)

11. Which of the following is equivalent to \(x^3 - 8\)?

\(\text{A. } (x - 2)^3\)
\(\text{B. } (x - 2)^2(x + 2)\)
\(\text{C. } (x - 2)(x^2 + 2x + 4)\)
\(\text{D. } (x - 2)(x^2 + 4x + 4)\)

12. Which product of factors is equivalent to \(x^{100} - 36\)?

\(\text{A. } (x^{10} - 6)(x^{10} + 6)\)
\(\text{B. } (x^{10} - 18)(x^{10} + 18)\)
\(\text{C. } (x^{50} - 6)(x^{50} + 6)\)
\(\text{D. } (x^{50} - 18)(x^{50} + 18)\)

13. The total area of a square \(4x^2 - 4xy + y^2\). Which factor could represent the length of one of the sides of the square?

\(\text{A. } 4x - y\)
\(\text{B. } 2x - 2y\)
\(\text{C. } 2x - y\)
\(\text{D. } 2x^2 - 2xy + y^2\)
14 Which is the graph of the complex number \((-2 + 5i)\)?

A. 

B. 

C. 

D. 

15 If \(i = \sqrt{-1}\), what is the value of \(i^6\)?

A. 1  
B. -1  
C. \(i\)  
D. -\(i\)

16 What is the sum of \(2 + 3i\) and \(-1 + 7i\)?

A. \(1 + 10i\)  
B. \(3 - 4i\)  
C. \(5 + 6i\)  
D. \(9 + 2i\)

17 Simplify.

\[
\frac{(4 + 4i)(1 - 2i)}{3 - i}
\]

A. 4  
B. \(-2 - 2i\)  
C. \(\frac{16 - 12i}{5}\)  
D. 5
What is an equivalent form of \((10 + 11i)^2\)?

A. 1  
B. \(-21\)  
C. \(-21 + 220i\)  
D. \(221 + 220i\)

Add the fractions below.

\[
\frac{5x^2y^6}{4y^2} + \frac{6x^2y}{x^4}
\]

A. \(30x^6y\)  
B. \(\frac{x^2(5 + 24y^3)}{4y^3}\)  
C. \(\frac{15}{2x^2y^3}\)  
D. \(\frac{5x^2 + 24x^4y^5}{4y^4}\)

Simplify.

\[
\frac{1 - 7x^{-1}}{1 - 49x^{-2}}
\]

A. \(\frac{1}{x + 7}\)  
B. \(\frac{x}{x + 7}\)  
C. \(\frac{x}{x - 7}\)  
D. \(\frac{1 + 7x}{1 + 49x^2}\)

Simplify.

\[
\frac{x^2 + 2x - 8}{x^2 + 8x + 15} + \frac{x + 4}{x^2 + 10x + 25}
\]

A. \(\frac{x - 2}{x + 3}\)  
B. \(\frac{(x - 2)(x + 5)}{(x + 3)}\)  
C. \(\frac{(x - 2)(x + 4)^2}{(x + 3)(x + 5)^3}\)  
D. \(\frac{x^4 + 12x^3 + 37x^2 - 30x - 200}{x^3 + 12x^2 + 47x + 60}\)

Simplify.

\[
\frac{99n^{-5}(m^4p^{-6})^2}{(3n^{-3}mp^{-2})^2}
\]

A. \(\frac{33nm^8}{p^8}\)  
B. \(\frac{11m^4}{n^4p^4}\)  
C. \(\frac{11nm^6}{p^8}\)  
D. \(\frac{1089n^6}{n^4p^8}\)
23 \( \frac{x^2 - 16}{5 - x} \cdot \frac{x^2 - 9x + 20}{x + 4} = \)

A. \(-(x - 4)(x + 4)\)  
B. \((x - 4)(x + 4)\)  
C. \(-(x - 4)^2\)  
D. \((x - 4)^2\)

24 Simplify.

\(\frac{x^2 - 9}{x^2 - x - 6}\)

A. \(-3\)  
B. \(\frac{x - 3}{x - 2}\)  
C. \(\frac{x - 3}{x + 2}\)  
D. \(\frac{x + 3}{x + 2}\)

25 What are the solutions to the equation \(\frac{5}{x} - \frac{15}{x^2} = 3\)?

A. \(x = \frac{5 + \sqrt{205}}{6}, x = \frac{5 - \sqrt{205}}{6}\)  
B. \(x = \frac{5 + 6i\sqrt{5}}{6}, x = \frac{5 - 6i\sqrt{5}}{6}\)  
C. \(x = \frac{5 + i\sqrt{205}}{6}, x = \frac{5 - i\sqrt{205}}{6}\)  
D. \(x = \frac{5 + i\sqrt{555}}{5}, x = \frac{5 - i\sqrt{555}}{5}\)

26 What are the solutions to the equation \(x^2 - 12x + 20 = -20\) ?

A. \(x = 2; x = 10\)  
B. \(x = -18; x = -10\)  
C. \(x = 2 + 2i\sqrt{5}; x = 10 + \frac{2i}{2}\sqrt{5}\)  
D. \(x = 6 + 2i; x = 6 - 2i\sqrt{5}\)

27 There are two numbers with the following properties:

1) One number is 5 more than twice the other number.
2) The product of the two numbers is 7 more than their sum.

Which of the following represents possible values of the two numbers?

A. \(-3, -4\)  
B. \(-2, 1\)  
C. \(2, 9\)  
D. \(3, 11\)

28 Paula is solving the equation \(x^2 + 22x = 15\) by completing the square. What number must be added to both sides of the equation to complete the square?

A. 1  
B. 11  
C. 44  
D. 121

29 Which of the following most accurately describes the translation of the graph: \(y = (x - 7)^2 + 16\), from the origin \((0, 0)\)?

A. 16 units up, 7 units left  
B. 7 units down, 16 units right  
C. 16 units up, 7 units right  
D. 7 units up, 16 units right
30 Which of the following sentences is true about the graphs of $y = 4(x - 8)^2 - 5$ and $y = -4(x - 8)^2 - 5$?

A. The graphs have the same shape with different vertices.  
B. The graphs have different shapes with different vertices.  
C. One graph has a vertex that is a maximum while the other has a vertex that is a minimum.  
D. Both graphs have vertices that are maximums.

31 What are the $x$-intercepts of the graph of $y = 6x^2 - x - 7$?

A. $\frac{7}{6}$ and $-1$  
B. $-\frac{7}{6}$ and $1$  
C. $\frac{7}{2}$ and $-\frac{1}{3}$  
D. $-\frac{7}{2}$ and $\frac{1}{3}$

32 What is the minimum of the graph described by $y = (x - 2)^2 - 3$?

A. $(2, 3)$  
B. $(-2, 3)$  
C. $(2, -3)$  
D. $(-2, -3)$

33 Which ordered pair is the vertex of $f(x) = x^2 - 8x + 7$?

A. $(0, 7)$  
B. $(1, 0)$  
C. $(1, 7)$  
D. $(4, -9)$
34 Which is the graph of \( y = -\frac{1}{2}(x - 3)^2 - 1 \)?

A. 

B. 

C. 

D. 

35 Given: \( 2^x = 64 \)

Which of the following expressions is the value of \( x \)?

A. \( \log_2 64 \)  
B. \( \log_{64} 2 \)  
C. \( \sqrt[2]{64} \)  
D. \( \frac{64}{2} \)

36 Solve for \( x \).

\( \log_6 x = 3 \)

A. \( x = \frac{1}{2} \)  
B. \( x = 2 \)  
C. \( x = 216 \)  
D. \( x = 729 \)
37 Find the value of \( x \).
\[
\log_{16} 4 = x
\]
A. \( \frac{1}{2} \)  
B. \( \frac{1}{4} \)  
C. 2  
D. 4

38 Marcus wants to express \( \log_z \frac{x^3 y}{z^2} \) in expanded form. His work is shown below.

Given: \( \log_z \frac{x^3 y}{z^2} \)

Step 1: \( \log_z x^3 + \log_z y - \log_z z^2 \)
Step 2: \( 3 \log_z x + \log_z y - \frac{1}{2} \log_z z \)
Step 3: \( 3 \log_z x + \log_z y - \frac{1}{2} (1) \)
Step 4: \( 3 \log_z x + \log_z y - \frac{1}{2} \)

Results: \( \log_z \frac{x^3 y}{z^2} = 3 \log_z x + \log_z y - \frac{1}{2} \)

Where did Marcus first make an error?
A. Step 1  
B. Step 2  
C. Step 3  
D. There are no errors.

39 Simplify.
\[
g^{2x} = 27^{x+2}
\]
1. \( (3^2)^{2x} = (3^3)^{x+2} \)
2. \( 3^{4x} = 3^{3x+2} \)
3. \( 4x = 3x + 2 \)
4. \( x = 2 \)

Which is the first incorrect step in the argument above?
A. 1  
B. 2  
C. 3  
D. 4
The table below shows the estimated population of fish living in the local lake as determined by the local environment council every 10 years between 1960 and 1990. The equation \( y = 1500(0.9)^x \) describes the curve of best fit for the fish population \((y)\). Let \( x \) represent the number of 10–year intervals since 1960.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
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<tbody>
<tr>
<td>1960</td>
<td>1500</td>
</tr>
<tr>
<td>1970</td>
<td>1350</td>
</tr>
<tr>
<td>1980</td>
<td>1210</td>
</tr>
<tr>
<td>1990</td>
<td>1100</td>
</tr>
</tbody>
</table>

Using this equation, what is the approximate predicted population of fish living in the lake in the year 2020?

A. 720  
B. 770  
C. 800  
D. 980

Which of the following equations could be used to predict the value, \( V(t) \), after \( t \) years, of a $200 investment that earns 12% compounded monthly?

A. \( V(t) = 200(0.12)^t \)  
B. \( V(t) = 200(1 + 0.12)^t \)  
C. \( V(t) = 200(0.01)^{12t} \)  
D. \( V(t) = 200(1 + 0.01)^{12t} \)

Frank suspects a function he created to predict the population of bacteria is flawed. His data indicates the population began with 150 cells and grew by 20 percent every hour.

His prediction function is "The population of bacteria is \( B(h) = 150(2)^h \) after \( h \) hours."

What is Frank's error?

A. Frank should have used (.20) not (.2) in the equation.  
B. Frank should have used (1.2) not (.2) in the equation.  
C. Frank should have used a power of \( h - 1 \) instead of \( h \).  
D. Frank should have used a power of \( h + 1 \) instead of \( h \).

\[ \log_3 11 = \]

A. \( \log 11 - \log 3 \)  
B. \( \log 11 + \log 3 \)  
C. \( \frac{\log 11}{\log 3} \)  
D. \( (\log 11)(\log 3) \)

Evaluate the given expression.

\( \log_5 25 \)

A. 2  
B. 5  
C. 125  
D. 9,765,625
45. Within which range of numbers does \( x \) fall if \( x = \log_5 28 \)?
   A. between 1 and 2  
   B. between 2 and 3  
   C. between 5 and 6  
   D. none of these

46. For what values of \( x \) is \( \frac{x^2 - 4}{x - 2} = x + 2 \) true?
   A. That equation is true for all values of \( x \).  
   B. That equation is true for some, but not all non-zero values of \( x \).  
   C. There are no non-zero values of \( x \) for which that equation is true.  
   D. There is not enough information to answer this question.

47. On a recent test, Michael wrote the equation \( \frac{x^2 + 9x + 18}{x + 3} = x + 6 \). Which of the following statements is correct about the equation he wrote?
   A. The equation is never true.  
   B. The equation is only true when \( x = -3 \).  
   C. The equation is always true.  
   D. The equation is always true, except when \( x = -3 \).

48. \( \log_a b \) is defined and has a real number value. If \( b \) is positive, which of the following is true?
   A. \( a \) must always be positive.  
   B. \( a \) can be positive, but does not have to be.  
   C. \( a \) can never be positive.  
   D. There is not enough information to solve this problem.

49. Which of the following conclusions is true about the statement below?
   \( x^3 = x + x^2 \)
   A. The equation is never true.  
   B. The equation is always true.  
   C. The equation is true when \( x \) is even.  
   D. The equation is true when \( x = 0 \).

50. Which of the following equations becomes \( (x + 3)^2 - (y + 1)^2 = 1 \) when changed to standard form?
   A. \( x^2 - y^2 + 3x - 1y = 1 \)  
   B. \( x^2 - y^2 + 6x - 2y = 1 \)  
   C. \( x^2 - y^2 + 3x - 1y = -7 \)  
   D. \( x^2 - y^2 + 6x - 2y = -7 \)

51. Jeff needs to select four players for his basketball team. There are 16 players to choose from. How many possible combinations of teams could Jeff choose?
   A. 16  
   B. 64  
   C. 1,820  
   D. 43,680
52 Justin picks 3 flavors of ice cream from a total of 12 flavors to mix together. How many different flavor mixes can he create?

A. 36  B. 220  C. 1,320  D. 1,728

53 Jessica and Kyle each bought one of the 250 raffle tickets sold at the county fair. If two tickets will be drawn and awarded prizes, what is the probability that both Jessica and Kyle hold winning tickets?

A. \( \frac{1}{125} \)  B. \( \frac{1}{15,625} \)  C. \( \frac{1}{31,125} \)  D. \( \frac{1}{62,250} \)

54 A jar contains six balls bearing the letters A – F. Two balls are drawn from the jar. What is the probability that one of them is the A ball?

A. 1 in 15  B. 1 in 3  C. 1 in 30  D. 11 in 30

55 Expand.

\((b^2 + 2)^3\)

A. \( b^5 + 2b^4 + 4b^2 + 8 \)  B. \( b^5 + 6b^4 + 12b^2 + 8 \)  C. \( b^6 + 2b^4 + 4b^2 + 8 \)  D. \( b^6 + 6b^4 + 12b^2 + 8 \)

56 Which of the following represents the 4th term in the expansion of \((2q – 3r)^4\)?

A. \( 3q^4 \)  B. \( 81q^4 \)  C. \( -54qr^3 \)  D. \( -216qr^3 \)
57. What is $n^{\text{th}}$ term in the series below?
   \[ 6 + 12 + 18 + 24 + \ldots \]
   A. $5n + 1$  B. $5n + n$  C. $6n + 1$  D. $6n + n$

58. What is the next term in the geometric series below?
   \[ 16 + 8 + 4 + 2 + \ldots \]
   A. $-2$  B. $0$  C. $1$  D. \(\frac{1}{2}\)

59. Given:
   \[ f(x) = 3 - 2x \]
   \[ g(x) = 4x - 2 \]
   Which of the following expressions represents $(f - g)(x)$?
   A. $5 - 6x$  B. $1 - 6x$  C. $2x - 5$  D. $6x - 5$

60. Elle used the following steps to find $f(-2)$ when $f(x) = 3x^2 - 5x + 4$
   
   Step 1: $f(-2) = 3(-2)^2 - 5(-2) + 4$
   
   Step 2: $f(-2) = 3(4) - 5(-2) + 4$
   
   Step 3: $f(-2) = 12 + 10 + 4$
   
   Step 4: $f(-2) = 26$
   
   Result: $f(-2) = 26$
   
   What is wrong with Elle's work?
   A. In Step 1, Elle made a mistake writing the expression for $f(-2)$.
   B. In Step 2, Elle made a mistake simplifying $3(-2)^2$.
   C. In Step 3, Elle made a mistake simplifying $-5(-2)$.
   D. There are no mistakes. Elle's work is correct.

61. Mr. Ricketts is randomly distributing 25 hot chocolates and 20 iced coffees to his fellow board members. What is the probability that the first cup he hands out will be hot chocolate and the second cup will be an iced coffee?
   
   A. $\frac{5}{9}$  B. $\frac{45}{89}$  C. $\frac{5}{11}$  D. $\frac{25}{99}$
Which of the following is a correct definition of conditional probability?

A. Conditional probability is a conclusion drawn based on what one already knows and on that alone.
B. Conditional probability is defined as the number of favorable outcomes divided by the total number of possible outcomes.
C. Conditional probability means that the occurrence of some event $A$ automatically implies the non-occurrence of a second event $B$.
D. Conditional probability is the probability of some event $A$, assuming event $B$.

In California, 29% of college students that earn a bachelor's degree have a starting salary of $35,000 or higher. Of starting entry positions, 40% have a salary of $35,000 or higher. What is the probability that a person in one of these positions has a bachelor's degree?

A. 11.0%  
B. 13.8%  
C. 69.0%  
D. 72.5%
Mrs. Lang's Class

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>Lydia</td>
<td>44</td>
</tr>
<tr>
<td>Ronnie</td>
<td>29</td>
</tr>
<tr>
<td>Caleb</td>
<td>39</td>
</tr>
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<td>Seth</td>
<td>32</td>
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<td>Randy</td>
<td>39</td>
</tr>
<tr>
<td>Chad</td>
<td>44</td>
</tr>
<tr>
<td>Gina</td>
<td>48</td>
</tr>
</tbody>
</table>

Using the information provided, what is the standard deviation of the set of scores?

A. 6.14  
B. 6.63  
C. 37.71  
D. 44.00

What is the variance of the set of test scores from Mrs. Lang's class?

A. 6.14  
B. 6.63  
C. 37.71  
D. 44.00