1. Perform the following operation and simplify:

\[ 6(4x^3 + x^2 - 1) - 7(5x^3 - 2x + 2) \]

A. \(-11x^3 + 6x^2 + 14x + 20\)
B. C. \(-11x^3 + 6x^2 - 14x - 20\)
C. \(-11x^3 + 6x^2 + 14x - 20\)
D. D. \(-11x^3 + x^2 + 14x - 20\)
E. None of the above

2. Perform the following operation and simplify:

\[ \frac{x^2 + 7x + 10}{x^2 + 8x + 15} \cdot \frac{x^2 + 3x}{x^2 - 3x - 10} \]

A. \(\frac{x^2 + 3x}{x - 5}\)
B. \(\frac{x}{x^2 + 8x + 15}\)
C. \(\frac{1}{x - 5}\)
D. \(\frac{x}{x - 5}\)
E. None of the above

3. Perform the following operation and simplify:

\[ \frac{-1}{x} + \frac{5}{x^4 + 4} + \frac{4}{x^5 + 4x} \]

A. \(\frac{5 + x^3}{x^4 + 4}\)
B. \(\frac{5 - x^3}{x^4 + 4}\)
C. \(\frac{x^3 - 5}{x^4 + 4}\)
D. \(\frac{5 + x^3}{x(x^4 + 4)}\)
E. None of the above
4. Factor completely the following Expression:

\[10x^2 + 25x + 6x + 15\]

A. \((5x - 3)(2x - 5)\)
B. \((10x - 3)(x - 5)\)
C. \((5x + 3)(2x + 5)\)
D. \((10x + 3)(x + 5)\)
E. None of the above

5. Perform the following operation assuming that \(x\) and \(y\) are positive real numbers. Write the answer using positive exponents only:

\[\left(\frac{xy^{-2}}{x^{-4}y}\right)^{-3}\]

A. \(\frac{x^6}{y^{12}}\)
B. \(\frac{y^9}{x^{15}}\)
C. \(\frac{x^9}{y^{15}}\)
D. \(\frac{y^6}{x^{12}}\)
E. None of the above

6. Write the following expression in radical form:

\((16x)^{\frac{3}{5}}\)

A. \(\sqrt[5]{16x^3}\)
B. \(\sqrt[3]{(16x)^5}\)
C. \(\sqrt[5]{(16x)^3}\)
D. \(8\sqrt[5]{x^3}\)
E. None of the above
7. Perform the following operation and simplify:

\[ \sqrt[3]{16x} - 4\sqrt{2x} - 2\sqrt[3]{54x} \]

A. \(-8\sqrt[3]{2x}\)
B. \(-8\sqrt[4]{4x}\)
C. \(9\sqrt[3]{2x}\)
D. \(\sqrt[3]{16x} - 10\sqrt[3]{2x}\)
E. None of the above

8. Simplify the following expression:

\[ \frac{\sqrt{x} - \frac{1}{6\sqrt{x}}}{\sqrt{x}} \]

A. \(\frac{6\sqrt{x} - 1}{6x}\)
B. \(\frac{6x - 1}{6x}\)
C. \(\frac{6x + 1}{6x}\)
D. \(\frac{6x - 1}{6}\)
E. None of the above

9. Solve the linear equation:

\[ \frac{-2x}{5} + \frac{1}{2} = \frac{-x}{10} + \frac{1}{4} \]

A. \(x = \frac{1}{11}\)
B. \(\frac{5}{6}\)
C. \(\frac{1}{2}\)
D. \(-30\)
E. None of the above
10. Solve the following inequality, write your answer in Interval notation

\[-3(4x - 1) < -15x + 9\]

A. \((-\infty, 2)\)
B. \((-\infty, -15]\)
C. \((-15, \infty)\)
D. \((2, \infty)\)
E. None of the above

11. Solve the following inequality and write your answer in Interval notation:

\[\left|\frac{5 - 4x}{6}\right| \leq 2\]

A. \((-\infty, -\frac{7}{4}) \cup \left[\frac{17}{4}, \infty\right)\)
B. \((-\infty, -\frac{7}{4}] \cup \left(\frac{17}{4}, \infty\right)\)
C. \([-\frac{7}{4}, \frac{17}{4}]\)
D. No solution
E. None of the above

12. Solve the following quadratic equation:

\[3x(x + 1) = 1\]

A. \(x = \frac{1}{2}\)
B. \(x = \frac{-3 + \sqrt{21}}{6}, \quad x = \frac{-3 - \sqrt{21}}{6}\)
C. \(x = \frac{3 + \sqrt{21}}{6}, \quad x = \frac{3 - \sqrt{21}}{6}\)
D. \(x = 0, \quad x = \frac{1}{3}\)
E. None of the above
13. Solve the following quadratic Inequality, write your answer in interval notation and graph it:

\[ x^2 - 8 \leq 7x \]

A. \([-8, 1]\)

B. \([-1, 8]\)

C. \([-8, -1]\)

D. \([1, 8]\)

E. None of the above

14. The fixed costs of a company producing calculators are $25,000 and it costs $20 to produce one calculator. How many calculators were produced if the costs is $39,000?

A. 1950 calculators

B. 1250 calculators

C. 700 calculators

D. 1825 calculators

E. None of the above

15. Determine whether the equation \( x = y^2 + 15 \) defines \( y \) as a function of \( x \)

A. Yes

B. No

16. Find the domain of the following function:

\[ f(x) = \frac{3x^2 - 6x}{\sqrt{6 - x}} \]

A. All real numbers \( x \) such that \( x \neq 6 \)

B. All real numbers \( x \) such that \( x \neq 2, x \neq 0 \) and \( x \neq 6 \)

C. All real numbers \( x \) such that \( x \leq 6 \)

D. All real numbers \( x \) such that \( x < 6 \)

E. None of above
17. If \( f(x) = 5x^2 + x + 1 \), find

\[
\frac{f(2 + h) - f(2)}{h}
\]

A. 0
B. \( 5h^2 + 21h \)
C. \( 21 + 5h \)
D. \( 5h \)
E. None of the above

18. Write the following quadratic equation in the form \( y = a(x - h)^2 + k \):

\( f(x) = x^2 + 10x + 18 \)

A. \( (x + 5)^2 - 7 \)
B. \( (x - 5)^2 - 7 \)
C. \( (x + 5)^2 + 7 \)
D. \( (x - 5)^2 + 7 \)
E. None of the above

19. Determine whether the following function has a maximum or a minimum and find its value:

\( f(x) = -x^2 - 18x - 90 \)

A. Minimum, \(-9\)
B. Maximum, \(9\)
C. Minimum, \(0\)
D. Maximum, \(-9\)
E. None of the above
20. Given the following Graph, Find the coordinates of the vertex and the intercepts:

![Graph Image]

A. vertex (3, –1); x-intercepts 4, 2; y-intercept 8
B. vertex (3, –1); x-intercepts 8; y-intercepts 2, 4
C. vertex (–1, 3); x-intercepts 4, 2; y-intercept 8
D. vertex (2, 4); x-intercepts 3; y-intercept –1
E. None of the above

21. The fixed costs of a company producing pants are $50,000. If the selling price of the company is $90 per pant, what is the revenue functions \( R(x) \) coming from the sale of \( x \) pants?

A. \( R(x) = 50000 + 9x \)
B. \( R(x) = 9x \)
C. \( R(x) = 50000x - 9 \)
D. \( R(x) = 9x - 50000 \)
E. None of the above

22. The revenue from the sale of \( x \) thousands units from a certain product is modeled by the function \( R(x) = -2x^2 + 42x + 7 \). If the cost of producing \( x \) thousands units is modeled by \( C(x) = 30x + 23 \), how many items should be produced and sold for the company to break even?

A. \( x = 400 \) units
B. \( x = 2, x = 4 \) units
C. \( x = 2000, x = 4000 \) units
D. \( x = 0, x = 4 \) units
E. None of the above
23. Find the slope and the $y-$intercept of the line given by the equation 

\[ 6x - 2y = -4 \]

A. $m = 6; y-$intercept $(0, -4)$  
B. $m = 3; y-$intercept $(0, 2)$  
C. $m = 3; y-$intercept $(2, 0)$  
D. $m = -2; y-$intercept $(0, 2)$  
E. None of the above

24. Write the equation of the line passing through the point $(-2, 5)$ and perpendicular to the line given by the equation $5x + 10y - 8 = 0$

A. $y = \frac{1}{2}x + 6$  
B. $y = -2x + 1$  
C. $y = 2x + 9$  
D. $y = -\frac{1}{2}x + 4$  
E. None of the above

25. Write the equation of the vertical line passing through the point $(-5, 6)$

A. $y = 6$  
B. $x = -5$  
C. $y = -5x + 6$  
D. $x = 6$  
E. None of the above

26. Write the following in logarithmic form (do not solve):

\[ 10^{3x+1} = 5 \]

A. $3x + 1 = \log(5)$  
B. $3x + 1 = \ln(5)$  
C. $3x + 1 = \log(10)$  
D. $3x + 1 = \ln(10)$  
E. None of the above

27. Given that $x, y, z$ and $b$ are positive numbers, write the following expression in condensed form (as a single log)

\[ \log_4(x) - \log_4(y) + 5\log_4(z) \]

A. $\log_4(x - y + z^5)$  
B. $\log_4(x - y + 5z)$  
C. $\log_4 \left( \frac{x+5z}{y} \right)$  
D. $\log_4 \left( \frac{xy^5}{z} \right)$  
E. None of the above
28. Find the domain and graph the following function:

\[ f(x) = \log_3 x \]

A. Domain \((0, \infty)\)  
B. Domain \((-\infty, \infty)\)  
C. Domain \((-\infty, \infty)\)  
D. Domain \((0, \infty)\)  
E. None of the above
29. Solve the following exponential equation:
\[ 2^{12-2x} = 64 \]
A. \( x = 3 \)  
B. \( x = 6 \)  
C. \( x = 32 \)  
D. \( x = -3 \)  
E. None of the above

30. Solve the following logarithmic equation:
\[ 4\ln(e^{2x}) = 64 \]
A. \( x = 16 \)  
B. \( x = 8 \)  
C. \( x = 32 \)  
D. \( x = 128 \)  
E. None of the above
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