Some Precalculus Problems

1. Express the area of a circle, \( A \), in terms of its circumference, \( C \).

2. Simplify: \( \sqrt[3]{\frac{-16x^3}{2y^6}} \).

3. Perform the indicated operations and simplify: \( \left( m^{n+1}r^n \right) \left( 3m^n r^{2n} \right)^{-1} \).

4. Perform the indicated operations and simplify: \( \frac{ab}{\frac{1}{a} + \frac{1}{b}} \).

5. Find \( f^{-1}(x) \) for \( f(x) = \frac{1-3x}{4} \).

6. Evaluate \( (5x+1)^{\frac{3}{4}} - (7-x)^0 \) for \( x = 3 \).

7. Evaluate \( -(2b^2)^{-1} \) when \( b = -2 \).

8. Find the interval where \( g(x) > 0 \) if \( g(x) = -x^2 - x + 6 \).

9. If \( f(t) = \frac{2}{1-t} \), for what value of \( t \) does \( f(t) = 3 \) ?

10. Simplify completely: \( 2u\left(3u^2 -1\right) - \left(-8u^3 -14u +6\right) \).

11. Simplify completely: \( 4(2x+1)^2 + 3(2x+1)+1 \).

12. Factor completely: \( 32x^4y - 162y \).

13. What is the remainder when \( 5x^2 - 2x + 1 \) is divided by \( x-1 \)?

14. Find \( a \) so that the two lines do not intersect: \( y = 4x + 2 \), \( y - 3 = ax \).

15. Perform the indicated operation and simplify: \( \frac{4m^2 - v^2}{3m-1} + \frac{2m^2 + mv}{3m-1} \).

16. Perform the indicated operation and simplify: \( \frac{3c}{c-2} + \frac{c+1}{2-c} \).

17. Simplify completely: \( \frac{x}{a} - \frac{a}{1} \).

18. Solve for \( z \): \( 7z - (4z - 9) = 24 + 5(z-1) \).

19. Solve for \( x \): \( \frac{a}{3} + 5x = b \left( \frac{x}{3} + 2 \right) \).

20. Solve for \( r \): \( S = \frac{2r-a}{r-1} \).

21. Solve for \( R \): \( V = \frac{3R}{a} - \frac{R}{b} \).

22. Solve for \( t \): \( 2t^2 + 4t = 9t + 18 \).

23. Solve for \( s \): \( -2s^2 - 4s + 2s^3 = 0 \).
24. Solve for $m$: $m^3 + 3m^2 - 4m - 12 = 0$.
25. Solve for $p$: \( \frac{4}{p} - \frac{2}{p + 1} = 3 \).
26. To get a B in a course a student must have an average of at least 80% on five tests that are worth 100 points each. On the first four tests a student scores 92%, 83%, 61%, and 71%. Determine the lowest score the student can receive on the fifth test to assure a grade of B for the course.
27. The area of a rectangle is 84 square feet and the length is 6 feet longer than the width. If $w$ represents the width, write an equation that could be used to find the dimensions of the rectangle.
28. A furniture store drops the price of a table 37 percent to a sale price of $364.77. What is the original price?
29. The cost of mailing envelopes by bulk mail is $35 for the first 200 plus $0.12 for each additional envelope over 200. Write a function to represent the cost of mailing $x$ envelopes when $x \geq 200$.
30. Solve for $t$: $(t + 2)^2 = 8$.
31. Solve for $y$: $-15y + 6y^2 = -y$.
32. Solve for $z$: $z^2 - 4z + 6 = 0$.
33. If a solution to $f(x) = 0$ is $x = 5$, find a solution to $3f(x+2) = 0$.
34. Solve for $x$: $\sqrt{x+6} = x$.
35. Solve for $r$: $5 - 3r \leq 8$.
36. Find the length of $b$:

![Diagram of a triangle with sides 6, 8, and 5]

37. Find the area of the triangle bounded by $y = 5 - 2x$, the $x$-axis, and the $y$-axis in the first quadrant.
38. Solve for $x$: $|2x + 1| \geq 7$.
39. Find the domain of $y = \sqrt{4 - 5x}$.
40. Graph $y = \frac{6}{x}$.
41. Find the intercepts of $y - 2x^2 - 13x = 6$.
42. Find the equation of the graph:

![Graph of a line]

43. Find the distance between (6,3) and (-2,4).
44. Find the midpoint of the line segment joining (6,9) and (-3,1).
45. What is the range of $y = 2(3)^x$?
46. Find the equation of the line perpendicular to $3y + 2x - 3 = 0$ passing through (4,-1).
47. Find \( f(-4) \) if \( f(x) = \frac{2x^2 - 11}{3x} \).
48. Find \( f(b + 2) \) if \( f(x) = 5 - 3(x+1) \).
49. Find the domain of \( g(x) = \frac{1}{x^2 - x - 12} \).
50. Find \( h(3) \) if \( h(t) = \begin{cases} 2t^2 - 5 & t < -1 \\ 4 - 3t & t \geq -1 \end{cases} \).

51. Find the domain and the range of the function:

![Graph](image)

52. If \((5,6)\) is a point on the graph of \( y = g(x) \), find a point on the graph of \( y = -g(x) + 1 \).
53. Find \( g(f(-2)) \) if \( f(x) = \log_4(-8x) \) and \( g(x) = x - 3 \).
54. If \( h(t) = \frac{t}{t+1} \), find the value of \( t \) so that \( h(t) = 3 \).
55. If the graph of \( y = f(x) \) is below, sketch the graph of \( y = |f(x)| \).

![Graph](image)

56. Sketch the graph of \( y = \log_3(x+2) \).
57. Rewrite \( 5^b = a \) in logarithmic form.
58. Rewrite as a single logarithm: \( \frac{1}{2} \log x + 4 \log y - 2 \log z \).
59. Solve for \( t \): \( 3^{2t} = 27^{2t-1} \).
60. Solve for \( r \): \( 3 + 6e^{2r} = 5 \).
61. Solve for \( y \): \( \log_3 y - \log_3(y-1) = 2 \).
62. Solve the system of equations:
   \[
   \begin{align*}
   4x + 3y &= 0 \\
   8x &= 9y + 2
   \end{align*}
   \]
63. If \( f(x) = -x^2 \) and \( g(x) = x + 4 \), find the values of \( x \) so that \( g(f(x)) > 0 \).
64. Express the length of side \( a \) in terms of \( m \):

\[
\begin{array}{c}
\text{8} \\
\downarrow \\
\text{m}
\end{array}
\]

65. If \( \tan \theta = B \) where \( \theta \) is an angle in quadrant I, express \( \sin \theta \) in terms of \( B \).

66. Find the trigonometric equation for this graph:

\[
\begin{array}{c}
0 & 1 & 2 & 3 & 4 \\
-1.5 & -1 & -0.5 & 0 & 0.5 & 1 & 1.5
\end{array}
\]

67. \( \sin(\theta + \pi) = \)

68. Find \( \cos\left(\frac{4\pi}{3}\right) \).