1. Simplify the expression, assuming $x$ and $y$ may be negative. 

$$4\sqrt[3]{x^8(y-1)^{12}}$$

1. ______________ (4)

2. Express as a polynomial. 

$$\left(x^{1/3} - y^{1/3}\right)\left(x^{2/3} + x^{1/3}y^{1/3} + y^{2/3}\right)$$

2. ______________ (4)

3. Simplify the expression. 

$$\left(3x + 1\right)^6 \frac{1}{2} \left(2x - 5\right)^{-1/2} (2) + \left(2x - 5\right)^{1/2} (6) \left(3x + 1\right)^5 (3)$$

3. ______________ (4)

4. Solve for the specified variable. 

$$\frac{2}{2x+1} - \frac{3}{2x-1} = \frac{-2x+7}{4x^2-1}$$

4. ______________ (4)
5. **Delivering Newspapers** It takes a girl 45 minutes to deliver the newspapers on her route; however, if her brother helps, it takes them only 20 minutes. How long would it take her brother to deliver the newspapers by himself?

(2.2 #33)

5. ___________________________ (4)

6. Solve for the specified variable.

\[ A = 2\pi r(r + h) \text{ for } r \]

(2.3 #53)

6. ___________________________ (4)

7. Find the solutions of the equation.

\[ 8x^3 - 12x^2 + 2x - 3 = 0 \]

(2.4 #56)

7. ___________________________ (4)

8. Solve the equation.

\[ 3|x + 1| - 2 = -11 \]

(2.5 #5)

8. ___________________________ (4)

9. Solve the inequality, and **express the solutions in terms of intervals** whenever possible.

\[ \frac{3}{|5 - 2x|} < 2 \]

(2.6 #65)

9. ___________________________ (4)
10. Solve the inequality, and **express the solutions in terms of intervals** whenever possible. \(^{(2.7 \#31)}\)
\[
\frac{x + 1}{2x - 3} > 2
\]

11. Given the points \(A(-4, -3)\) and \(B(6, 1)\). Find a formula that expresses the fact that an arbitrary point \(P(x, y)\) is on the perpendicular bisector \(l\) of segment \(AB\). \(^{(3.1 \#23)}\)

12. Sketch the graph \(x = -y^2 + 3\), and label the \(x\)- and \(y\)-intercepts. \(^{(3.2 \#11)}\)

13. Find an equation of the circle with center \(C(-4, 6)\) and passing through the point \(P(1, 2)\). \(^{(3.2 \#39)}\)
14. Find a general form of an equation of the line through the point \( A(7, -3) \) that is perpendicular to the line \( 2x - 5y = 8 \). 

\[(3.3 \#31)\]

15. Given \( f(x) = x^2 - x + 3 \). If \( a \) and \( h \) are real numbers, find \( \frac{f(a + h) - f(a)}{h} \), if \( h \neq 0 \). 

\[(3.4 \#9)\]

16. Sketch the graph of \( f(x) = \begin{cases} x + 2 & \text{if } x \leq -1 \\ x^3 & \text{if } -1 < x < 1 \\ -x + 3 & \text{if } x \geq 1 \end{cases} \) 

\[(3.5 \#51)\]

17. Express \( f(x) = -3x^2 - 6x - 5 \) in the form \( f(x) = a(x - h)^2 + k \) 

\[(3.6 \#9)\]
18. Given \( f(x) = \frac{x-1}{x-2} \) and \( g(x) = \frac{x-3}{x-4} \). (3.7 #33)

(a) Find \((f \circ g)(x)\).

18 (a) ________________________ (4)

(b) Find the domain of \((f \circ g)(x)\).

18 (b) ________________________ (4)

19. Find the quotient and the remainder if \( f(x) = 3x^3 + 2x - 4 \) is divided \( p(x) = 2x^2 + 1 \). (4.2 #3)

19. ___________________ (4)

20. Determine whether \( f(x) = x^2 - 9 \) is one-to-one. (5.1 #7)

20. ___________________ (4)
21. Sketch the graphs and dash in the asymptotes. (5.2 #11g and 5.4 #40)

a) Graph \( f(x) = 2^x - 3 \). (2) 

\[
\begin{align*}
\text{y} & \quad \text{x} \\
\end{align*}
\]

b) Graph \( f(x) = \ln|x - 1| \). (2) 

\[
\begin{align*}
\text{y} & \quad \text{x} \\
\end{align*}
\]

22. **U.S. population growth** The population \( N(t) \) (in millions) of the United States \( t \) years after 1980 may be approximated by the formula \( N(t) = 231e^{0.0100t} \). When will the population be twice what it was in 1980? (5.4 #63)

22. ________________ (4)

23. Solve the equation. (5.5 #23)

\[
\ln(-4 - x) + \ln 3 = \ln(2 - x)
\]

23. ________________ (4)
24. Solve the compound interest formula \[ A = P\left(1 + \frac{r}{n}\right)^{nt} \] for \( t \) using natural logarithms. 

\[ (5.6 \#52) \]

Bonus: If $1000 is deposited in a savings account that pays interest at a rate of 8.25% per year compounded continuously, find the balance after 5 years. 

\[ (5.3 \#5) \]

Bonus: \[ \] (4)