1. Solve $3x + 6 = 8 - 2x$.

2. Given that $x = 4$ is the solution to $ax + 3 = 2ax + 5$, what is $a$.

3. Graph the line $y = 0.5x - 3$ on the axes below.
4. Suppose a line passes through (2,5) and (3,7). What is another point on the line?

5. Approximately 8.7 million cars were sold in the U.S. in 1999, while 7.5 million were sold in 2004. Assuming the decline in sales was linear, how many cars were sold in the U.S. in 2003?

6. Solve (simplify) the inequality \(-4x + 3 \leq x + 5\).
7. Why are linear functions frequently used to model data, even when the long-term trend of the data is curving?
8. Solve \( x^2 + 4x - 21 = 0 \).

9. The height of a ball thrown upward with initial velocity 20m/sec is \( h(t) = 20t - 5t^2 \). What is the maximum height the ball reaches?
10. What is the equation of the parabola that has vertex at (-2,3) and passes through the point (5,-1)?
11. Let \( f(x) = x^2 + 3x + 1 \) and \( g(x) = 2x + 3 \). Compute each of the following. You must simplify your answer for full credit.
   a. \( f(g(x)) \)
   b. \( g(f(x)) \)

12. Solve the equation \( |2x + 3| = x - 5 \).
13. Solve (simplify) the inequality $x^2 - x + 5 < x + 8$.

14. The graph of $y = f(x)$ is shown. Draw the graph of $y = f^{-1}(x)$ on the same axes.
15. The graph of \( y = f(x) \) is shown below. Note that the graph passes through the lattice points (-6,0), (-5,4), (1,0), (8.0), and (9,6). Draw the graph of \( y = f(x + 1) - 2 \)

16. Simplify the equation \( y = 7^x \) by taking the logarithm of each side.
17. Suppose \( \log(a) = 1.2 \) and \( \log(b) = 3.7 \), what is \( \log(ab^2) \)?

18. Solve the equation \( 3e^{2x} = 5 \).

19. The Richter magnitude of an earthquake can be computed using the formula

\[
M = \log(A) + 3\log(8\Delta t) - 2.92
\]

where \( A \) is the amplitude of the motion on the seismograph in millimeters and \( \Delta t \) is the S-P time difference in seconds (the difference in time for S and P waves to reach the seismograph; this is used to measure the distance to the epicenter of the earthquake). If an earthquake causes the needle of a seismograph to vibrate with an amplitude of 68mm and the S-P time difference is 7 seconds, what is the magnitude of the earthquake on the Richter scale?
20. The graphs of $y$ vs. $x$ in standard scale, semi-log scale, and log scale are shown below (each graph shows the same data, but with different scales). Would a power model or an exponential model be the best fit for this data?
21. What is the present value of a payment of $12,000 to be made in 5 years, with a discount rate of 8% compounded quarterly.

22. Find all the solutions (real and complex) to \( x^3 + 4x^2 - 8x + 2 = x - 2 \). (Hint: one solution is \( x = 1 \).)
23. Find a polynomial with single roots at $x = 2$ and $x = -3$ and a double root at $x = 0$.

24. Find a rational function with roots at $x = 1$ and $x = 2$ and a pole at $x = 3$. 
25. Solve the equation \( \frac{x^2 + 3x + 2}{x - 3} = \frac{x^2 - 12x + 2}{x + 2} \).

26. Solve the system of equations

\[
\begin{align*}
2x + 3y - z &= 9 \\
y + 2z &= 7 \\
4z &= 8.
\end{align*}
\]
27. Solve the system of equations:

\[
\begin{align*}
4x - 15y + 17z &= -7 \\
3x - 12y + 11z &= -4
\end{align*}
\]

\[
\begin{bmatrix}
1 & -4 & 4 \\
4 & -15 & 17 \\
3 & -12 & 11
\end{bmatrix}
\begin{bmatrix}
x \\
y \\
z
\end{bmatrix}
= 
\begin{bmatrix}
-39 \\
-7 \\
3
\end{bmatrix},
\]

\[
\begin{bmatrix}
1 & -4 & 4 \\
4 & -15 & 17 \\
3 & -12 & 11
\end{bmatrix}^{-1} = \begin{bmatrix}
-39 & 4 & 8 \\
-7 & 1 & 1 \\
3 & 0 & -1
\end{bmatrix}.
\]

28. Write the following system of equations in matrix form:

\[
\begin{align*}
x + 3y + z &= 7 \\
2x - y + 4z &= 2 \\
y - 3z &= -5
\end{align*}
\]
29. Suppose a businessman has 400 man-hours of general carpentry and 300 man-hours of finishing available each week. The business sells two products, desks which require 5 hours of general carpentry and 4 hours of finishing, and chairs which require 3 hours of general carpentry and 1 hour of finishing. How many desks and chairs should the business make each week to make full use of the available labor?

30. Let \( A = \begin{pmatrix} 2 & 3 \\ -1 & 4 \end{pmatrix} \) and \( B = \begin{pmatrix} 5 & -2 \\ 4 & 6 \end{pmatrix} \). Compute \((I - A)B\) where \(I\) is the identity matrix.