1. Solve the equation below: (5 points)

\[7(w - 4) - 4w = -2(3w - 4)\]
\[7w - 28 - 4w = -6w + 8\]
\[3w = 36\]
\[w = 4\]

2. Solve for \(x\): \(\frac{x}{2} - \frac{4x - 1}{3} = -1\) (5 points)

a.) \(\frac{4}{5}\)

b.) \(\frac{5}{6}\)

c.) \(\frac{8}{5}\)

d.) \(1/3\)

e.) None of the above

3. In the literal equation below, solve for \(t\) in terms of the remaining variables. (5 points)

\[P = \frac{S}{1 + rt}\]

\[P(1 + rt) = S\]

\[P + Prt = S\]

\[Prt = S - P\]

\[t = \frac{S - P}{Pr}\]

e.) None of the above

d.) \((S - P) / Pr\)

c.) \(t = (S - P) / Pr\)

b.) \(t = S / (P + Pr)\)

a.) \(t = (S - 1) / (rP)\)

4. Solve for \(x\): \(3 + \sqrt{2x - 3} = x\) (5 points)

\[\sqrt{2x - 3} = x - 3\]
\[2x - 3 = x^2 - 6x + 9\]
\[0 = x^2 - 8x + 12\]
\[0 = (x - 2)(x - 6)\]
\[x = 2 \text{ or } 6\]

Check \(x = 2\): \(3 + \sqrt{1} = 2\) \(\text{No!}\)

Check \(x = 6\): \(3 + \sqrt{9} = 6\) \(\text{Yes!}\)
5. Solve the equation \( 2x^2 + 2x - 6 = -2 \) for \( x \). (5 points)

\[
\begin{align*}
2x + 2x - 4 &= 0 \\
x^2 + x - 2 &= 0 \\
(x + 2)(x - 1) &= 0 \\
x &= 1 \text{ or } x = -2
\end{align*}
\]

6. Solve the inequality below. State your answer in interval notation. (5 points)

\[ |7 - 2x| \geq 3. \]

\[ 7 - 2x \leq -3 \quad \text{or} \quad 7 - 2x \geq 3 \]

\[ -2x \leq -10 \quad \text{or} \quad -2x \geq -4 \]

\[ x \geq 5 \quad \text{or} \quad x \leq 2 \]

\[ (-\infty, 2] \cup [5, \infty) \]

7. Evaluate: \( \sum_{k=1}^{40} k \) (4 points)

\[
\begin{align*}
\sum_{k=1}^{40} k &= \frac{40 \cdot 41}{2} \\
&= 20 \cdot 41 = 820
\end{align*}
\]

8. In each application problem below represent all unknowns in terms of one variable, establish an appropriate equation or inequality and solve. Show all appropriate steps. (7 points each)

a.) The area of a rectangle is 100 sq. ft. and its length \( L \) is double its width \( W \). Find the dimensions \( L \) and \( W \) of the rectangle. (Hint: \( A = L \times W \))

Let \( W \) denote the width.

so \( 2W \) is the length.

The area is then \( 200 = 2W \cdot W \)

\[ W = 10 \text{ but only } W = 10 \text{ is appropriate for a length.} \]

\[ W = 10, \quad L = 20 \]

b.) A manufacturer of tables and chairs has the resources to make a total of 50 pieces of furniture. The manufacturer receives $10 profit on each table and $2 profit on each chair. The manufacturer must receive a total profit of at least $200. What is the minimum number of tables that must be made?

Let \( x \) = # of tables

Then \( 50 - x \) = # of chairs

The total profit must be at least $200

\[ 10x + 2(50-x) \geq 200 \]

\[ 8x \geq 100 \text{ or } x \geq 12.5 \text{ but need an integer} \]

At least 13 tables
9. Given the function \( f(x) = 3x^2 - 5 \), find \( f(-2) \), and \( f(x + h) \). (2 points each)

\[
\begin{align*}
    f(-2) &= 3(-2)^2 - 5 = 3 \cdot 4 - 5 = 12 - 5 = 7 \\
    f(x+h) &= 3(x+h)^2 - 5 = 3(x^2 + 2xh + h^2) - 5 \\
            &= 3x^2 + 6xh + 3h^2 - 5
\end{align*}
\]

\( f(-2) = \frac{7}{3x^2 + 6xh + 3h^2 - 5} \)

10. If \( f(x) = 2x \) and \( g(x) = x + 6 \) find: (a: 2 points, b, c, d: 3 points each)

   a.) \( (f + g)(x) = f(x) + g(x) = 2x + x + 6 = 3x + 6 \)

   b.) \( (f \circ g)(2) = f(g(2)) = f(2) = 2 \cdot 2 = 4 \cdot 8 = 32 \)

   c.) \( f(g(x)) = f(x+6) = 2(x+6) = 2x + 12 \)

   d.) \( (g \circ f)(x) = g(f(x)) = g(2x) = 2x + 6 \)

   \[
   \begin{align*}
   (f + g)(x) &= 3x + 6 \\
   (f \circ g)(2) &= 32 \\
   f(g(x)) &= 2x + 12 \\
   (g \circ f)(x) &= 2x + 6
   \end{align*}
   \]

11. Let \( f(x) = 5x - 4 \). Find \( \frac{f(x + h) - f(x)}{h} \). (5 points)

\[
\begin{align*}
    f(x+h) - f(x) &= 5x + 5h - 4 - (5x - 4) \\
                    &= 5x + 5h - 4 - 5x + 4 \\
    \frac{f(x+h) - f(x)}{h} &= \frac{5h}{h} = 5
\end{align*}
\]

\[
\frac{f(x + h) - f(x)}{h} = 5
\]

12. The inverse function of \( g(x) = 1 - 2x \) is: (5 points)

   a.) \( g^{-1}(x) = \frac{x + 3}{4} \)

   b.) \( g^{-1}(x) = \frac{1}{1 - 2x} \)

   c.) \( g^{-1}(x) = \frac{1-x}{2} \)

   d.) Does not exist

   e.) None of the above
13. Find functions \( f \) and \( g \) such that \( H(x) = f(g(x)) \) if \( H(x) = (x^2 + 1)^3 \). Note: An answer with \( f(x) = x \) will not be accepted (2 points each)

a.) \( f(x) \):
\[
\text{Left } f(x) = x^3
\]
and \( g(x) = x^2 + 1 \)
\[
\text{Then } \frac{f}{g(k)} = \frac{(x^2 + 1)^3}{x^2 + 1}
\]

b.) \( g(x) \):
\[
f(k) = x^3
\]
and \( g(x) = x^2 + 1
\]

\[
\text{Note: } f(x) = (x^2 + 1)^3
\]
\[
g(x) = x^2 + 1
\]

14. Graph the function \( y = f(x) = -(x - 1)^2 + 4 \) on the axes below. Determine the intercepts and identify the domain and range. (8 points)
\[
f(0) = -(-1)^2 + 4 = -1 + 4 = 3 \quad \text{y-int}
\]
\[
(0, 3) \quad \text{y-intercept(s)}: \quad (0, 3)
\]
\[
(x-1)^2 = 4
\]
\[
(x-1) = \pm 2
\]
\[
x = 1 \pm 2
\]
\[
x = 3, -1 \quad \text{x-intercept(s)}: \quad (-1, 0), (3, 0)
\]
\[
x = 1 - x \Rightarrow x = -1, 3
\]
\[
x = x \Rightarrow x = x
\]
\[
x = x \Rightarrow x = x
\]
\[
\text{Domain: } (-\infty, \infty)
\]
\[
\text{Range: } (-\infty, 4]
\]

15. Graph the piecewise function below on the axes provided. (5 points)
\[
y = f(x) = \begin{cases} x^2 & \text{if } x < 1 \\ x + 2 & \text{if } x \geq 1 \end{cases}
\]
\[
\text{Sketch } y = x^2 \text{ on } (-\infty, 1)\text{ with care to show the graph at } x = 1
\]
\[
\text{and } y = x + 2 \text{ on } (1, \infty)
\]
\[
\text{solid dot at } (1, 3)
\]
\[
\text{open dot at } (1, 1)
\]

16. Circle the letter to the right of each statement below to classify it as True (T) or False (F). (2 points each)

\[
\text{T} \quad F \quad \text{The graph of } y = x^2 \text{ is symmetric about the origin.}
\]
\[
\text{Subs } -y = -x \Rightarrow y = x \text{ SAME!}
\]

\[
\text{T} \quad \text{The graph of } y = |x - 1| \text{ is symmetric about the y-axis.}
\]
\[
\text{Subs } y = |x - 1| \Rightarrow y = -(x - 1) \Rightarrow y = |x + 1| \text{ NOT!}
\]

\[
\text{T} \quad \text{The graph of } x^2 - y^2 = 6 \text{ is symmetric about the x-axis.}
\]
\[
\text{Subs } x^2 - (-y)^2 = 6 \Rightarrow x^2 - y^2 = 6 \text{ SAME!}
\]

\[
\text{T} \quad \text{The graph of } x^2 + y^2 = 6 \text{ is symmetric about the origin.}
\]
\[
\text{Subs } (-x)^2 + (-y)^2 = 6 \Rightarrow x^2 + y^2 = 6 \text{ SAME!}
\]

\[
\text{T} \quad \text{The graph of } y = 5 \text{ is symmetric about the y-axis.}
\]
\[
\text{Subs } -x \text{ for } x \text{ the equation is } y = 5 \text{ SAME!}
\]