1. (24 points – 3 points each) Determine if each of the following assertions is valid. Indicate you answer by clearly circling either TRUE or FALSE.
   (a) The collection of pairs \{(0,1), (1,2), (2,3), (3,4)\} represents a function.
   [TRUE] [FALSE]

   (b) The slope of the line given by \(3y + 6x - 10 = 0\) is \(-\frac{1}{2}\).
   [TRUE] [FALSE]

   (c) There are real numbers which are not fractions.
   [TRUE] [FALSE]

   (d) The following

   \[
   \begin{array}{c}
   \text{\includegraphics[width=0.3\textwidth]{function_graph.png}}
   \end{array}
   \]
   is the graph of \(f(x) = -x^2 + 2\).
   [TRUE] [FALSE]

   (e) The following

   \[
   \begin{array}{c}
   \text{\includegraphics[width=0.3\textwidth]{function_graph.png}}
   \end{array}
   \]
   is the graph of \(f(x) = x^3\).
   [TRUE] [FALSE]

   (f) \((-1)^{10} = 1\).
   [TRUE] [FALSE]

   (g) If \(m\) is the slope of a line \(\ell\), then \(-m\) is the slope of any line perpendicular to \(\ell\).
   [TRUE] [FALSE]

   (h) No point on the line \(y = x + 2\) lies in the third quadrant.
   [TRUE] [FALSE]
2. Simplify the following expression:

\[ 3 \left[ (x - 1)^2 + 2x(2x + 1) - x^3 \right] \]

**Solution.** According to the rules of operations, we should first treat the exponent in \((x - 1)^2\). Since 

\[(x - 1)^2 = (x - 1)(x - 1) = x^2 - 2x + 1,\]

we get

\[3 \left[ x^2 - 2x + 1 + 2x(2x + 1) - x^3 \right] \]

The next operation we perform is the multiplication \(2x(2x + 1) = 4x^2 + 2x\). So now we have

\[3 \left[ x^2 - 2x + 1 + 4x^2 + 2x - x^3 \right] \]

Combining like terms inside the parenthesis gives

\[3 \left[ 5x^2 - x^3 + 1 \right] \]

Finally multiplying through by 3 we get

\[15x^2 - 3x^3 + 3.\]

3. Solve the following equation for \(x\)

\[ |2x + 5| = 4. \]

**Solution.** This is really two linear equations, namely

\[ 2x + 5 = 4 \quad \text{or} \quad 2x + 5 = -4. \]

The first gives \(x = -\frac{2}{3}\), the second gives \(x = -\frac{7}{2}\). So our answer is \(x = -\frac{1}{2}\) or \(x = -\frac{7}{2}\). Both of these check out.
4. Find the equation of the line through (1, 1) which is parallel to 
\[ y = -2x + 5. \]
Write your answer in slope-intercept form.

**Solution.** The line \( y = -2x + 5 \) has slope \(-2\) and any line parallel to it has the same slope. Thus we seek the line through (1, 1) with slope \(-2\). Using the point-slope form, we have 
\[(y - 1) = -2(x - 1),\]
and simplifying we get 
\[ y = -2x + 3. \]

5. Solve the following inequality for \(x\). Then graph your solution on the number line.
\[ \frac{x - 3}{3} + 3 \leq \frac{x}{8}. \]

**Solution.** We clear the denominators by multiplying through by 24 to get 
\[ 8(x - 3) + 3 \cdot 24 \leq 3x \]
or
\[ 8x - 24 + 72 \leq 3x. \]
Subtracting 3\(x\) and 48 from both sides gives 
\[ 5x \leq -48 \]
and dividing by 5 gives the solution 
\[ x \leq -\frac{48}{5}. \]
On the number line this is all points to the left of and including \(-\frac{48}{5}\).
6. Ticket sales for a play total $2200. There are three times as many adult tickets sold as children’s tickets. The price of an adult ticket is $6 and the price of a child’s ticket is $4. Find the number of children’s tickets which were sold.

**Solution.** Let \( x \) be the number of children’s tickets sold. Since they cost $4 each, they contribute \( 4x \) dollars to the total ticket sales. Meanwhile the number of adult tickets sold is three times the number of children’s tickets, namely \( 3x \), and since the cost of each is now $6, the adult tickets contribute \( 6 \cdot 3x = 18x \) dollars to the total sales. Thus

\[
4x + 18x = 2200
\]

or

\[
22x = 2200
\]

or finally

\[
x = 100.
\]

So there were 100 children’s tickets sold.