Math 161
Functions and Equations: Zeros and Solutions Worksheet

Solve:

1. \(2(3x - 1) = 3 - 4(x + 1)\)

2. In a triangle ABC, angle B is twice as large as angle A. Angle C measures 20° more than angle A. Find the measure of each angle.

Simplify:

3. \(\frac{3 + 2i}{i - 3} - \frac{4 - 6i}{2 - i}\)

4. \((2i)^4\)

Solve using the quadratic formula:

5. \(x^2 + 3x = 15\)

Solve:

6. \((2x + 1)^2 + 4(2x + 1) + 3 = 0\)

Graph, find the vertex, determine the domain and range, find the increasing and decreasing interval of the function:

7. \(f(x) = 2x^2 - 4x - 2\)

8. A Norman window is a rectangle with a semicircle on top as seen below. Sky Blue Windows Inc. is designing a Norman window that requires 288 in of trim. What dimensions will allow the maximum amount of light to enter a house?

![Diagram of a Norman window]
9. The number of children who were educated at home in the U.S. in various years is shown in the following table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of home-educated children (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>93</td>
</tr>
<tr>
<td>1988</td>
<td>225</td>
</tr>
<tr>
<td>1992</td>
<td>703</td>
</tr>
<tr>
<td>1995</td>
<td>1060</td>
</tr>
<tr>
<td>1997</td>
<td>1347</td>
</tr>
</tbody>
</table>

a. Make a scatterplot of the data, letting $x$ represent the number of years since 1984.
b. Determine what type of function fits the data.
c. Find the function that fits the data.
d. Graph the equation over the scatterplot.
e. Predict the number of children that will be home-educated in 2005, and 2010.

Solve:

10. \[ \frac{5x}{x - 4} - \frac{20}{x} = \frac{60}{x^2 - 4x} \]

11. \[ \sqrt{x + 1} - \sqrt{x - 2} = 5 \]

12. \[ \left| \frac{1}{3}x + 4 \right| = 2 \]

Solve, graph and write solution in interval notation:

13. \[ -\frac{5}{6}x + \frac{3}{2} > 2x - 1 \]

14. \[ -3 \leq 2x - 4 < 8 \]

15. \[ \left| 3x + 5 \right| \leq 3 \]