Week 4
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21CWIR_4
MATH 150 - WEEK-IN-REVIEW 4
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PROBLEM STATEMENTS

1. Write the given functions in standard form. Then determine the vertex, whether the vertex is a maximum or minimum, and the axis of symmetry.

   a) \( g(x) = -4x^2 - 16x - 9 \)

      \[
      \begin{align*}
      \text{y} &= a(x-h)^2 + k \\
      &= -4\left(x^2 + 4x + \frac{4}{4}\right) - 9 - \left(-\frac{16}{4}\right) \\
      &= -4\left(x + 2\right)^2 + 7 \\
      \end{align*}
      \]

      Vertex: \((-2, 7)\)  
      Max  
      \( x = -2 \)

   b) \( h(x) = \frac{1}{3}x^2 - 4x + 3 \)

      \[
      \begin{align*}
      h(x) &= a(x-h)^2 + k \\
      &= \frac{1}{3}\left(x - 6\right)^2 - 9 \\
      \end{align*}
      \]

      \[
      \begin{align*}
      h &= \frac{-b}{2a} = \frac{-(-4)}{2\left(\frac{1}{3}\right)} = \frac{4}{2/3} = 4 \cdot \frac{3}{2} = 6 \\
      h(6) &= \frac{1}{3}(6)^2 - 4(6) + 3 \\
      &= \frac{1}{3}(36) - 24 + 3 \\
      &= 12 - 24 + 3 \\
      &= -9 \\
      \end{align*}
      \]

   c) \( f(x) = 2x^2 + 2x + 3 \)
2. Find the \( x \)-intercepts of the following functions.
   a) \( f(x) = x^2 - 3x - 10 \)

   b) \( h(x) = \frac{1}{3}x^2 - 4x + 3 \)

   c) \( f(x) = 2x^2 + 2x + 3 \)

3. A farmer decides to enclose two rectangular stalls against a river so his horses have water access. The figure below shows the shape he wants to make. If he has 2100 feet of fencing, what values for \( x \) and \( y \) will maximize the enclosed area with no fencing against the river? What is the maximum area he can enclose?

   ![Diagram of two rectangular stalls against a river with fencing.
4. For the given polynomial functions, determine the end behavior of the graph.
   a) \( f(x) = 3x^8 + 7x^5 + 12 \)

   b) \( g(x) = -4x^9 - 3x^5 + 8 \)

   c) \( h(x) = 14x^2 + 9x^5 - 6 \)

5. Find the zeros and their multiplicities for the following functions, then determine the end behavior and maximum number of turning points. Roughly sketch the graph.
   a) \( k(x) = 2x^3 - 3x^2 - 9x \)
b) \( g(x) = -x^4 + 8x^2 - 16 \)

c) \( h(x) = 4x^5 - 9x^3 \)
6. Match the function \( g(x) = -x^3 + 8x^2 - 16x \) to its graph.

7. Match the function \( g(x) = 2x^4 - 3x^2 + 1 \) to its graph.