EXAM 1 - MATH 112 YOUR NAME:

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

- 1. Consider the quadratic function $f(x) = x^2 4x 21$.
 - (a) Find the location of the vertex.
 - (b) Find the opening direction:
 - (c) Find the *y*-intercept:
 - (d) Find the *x*-intercepts:
 - (e) Plot the graph labeling all significant points:

2. Consider the function y = f(x) whose graph is depicted below. Find the following:



3. Consider the function $f(x) = \begin{cases} x^3 + 3x^2 + 3x - 5, & \text{if } x \le 1\\ \frac{x^2 + 4x - 5}{x^2 + x - 2}, & \text{if } x > 1 \end{cases}$ Investigate whether f is continuous at x = 1 showing **all work** required with explanations.

4. Use the **limit definition** of the derivative to find an equation for the tangent line to $y = \sqrt{7-3x}$ at x = 1.

5. Compute the following derivatives using the rules:

$$(7x^5 - 5x^2 + 3)' =$$

$$(\frac{1}{3x^9} + \frac{7}{\sqrt[7]{x^2}})' =$$