Test #1 (Part 2, Calculator Okay) Name: _____

Math 160, Prof. Beydler Thursday, September 27, 2018

Directions: Show all work. No books or notes. A **scientific calculator** is allowed. Your desk and lap must be clear (no phones, no smart watches, etc.). If you have a phone in your lap or on your chair, it is considered cheating, and you will receive a zero on this test. Write your answers in the indicated places, or box your answers. Good luck!

1. (2 points) Find the average rate of change of $f(x) = 3x^2 - x$ between $x = -1$ and $x = 2$.

Answer: _____

2. (2 points) You buy a 1000-square-foot, rectangular piece of property with one side against a straight road. You'd like to protect your property with fencing, most of which costs \$6 per foot. However, the fencing next to the road must be sturdier and costs \$10 per foot. Find a function in one variable that models the cost of fencing your property.

Answer: _____

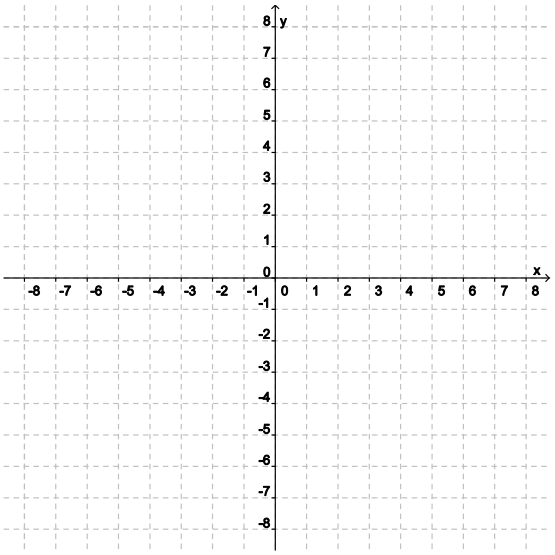
3. Let $f(x) = -x^2 - 4x + 3$.

a) (2 points) Express f in standard form.

Answer: $f(x) =$ _____

b) (1 point) Find the vertex of f. Vertex: _____

c) (2 points) Sketch the graph of f to the right. Be sure to plot the vertex and y-intercept.



d) (1 point) Find the maximum or minimum value of f.

Circle one: maximum minimum

The value is: _____

e) (1 point) Find the range of f.

Range: _____

4. (2 points) A frog jumps up. The height of the frog t seconds after jumping is given by the function $y(t) = 2.45t - 4.9t^2$ (in meters). What is maximum height attained by the frog? When does this happen?

Maximum height: _____

Time of maximum height: $t =$ _____

5. Let $f(x) = -2(x-3)^2(x+1)$.

a) (1 point) Find the x-intercepts of f. x-intercepts: _____

b) (1 point) Find the y-intercept of f. y-intercept: _____

c) (1.5 points) Find a test point between the x-intercepts of f, as well as a test point before the first x-intercept, and a test point after the last x-intercept.

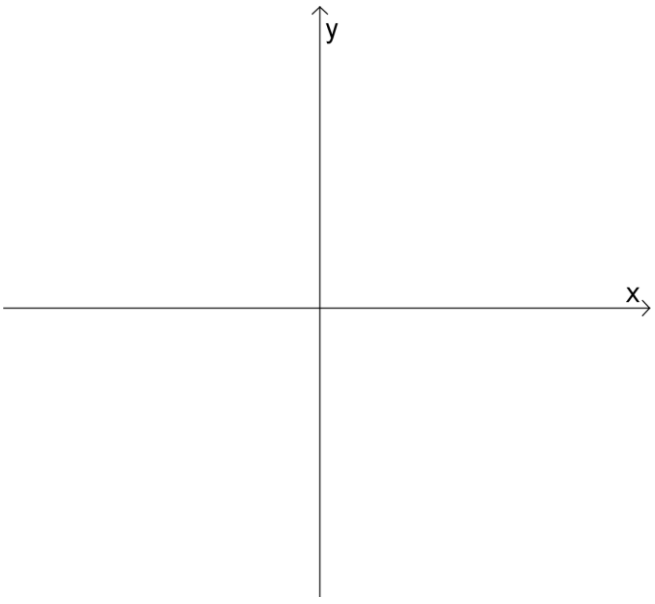
x	$f(x)$

d) (1 point) Determine the end behavior of f.

As $x \to \infty$, $f(x) \to$ _____

As $x \to -\infty$, $f(x) \to$ _____

e) (2 points) Sketch the graph of f.



6. (4 points) Find the complete factorization and all zeros of $P(x) = 2x^4 - 11x^3 + 15x^2 - 7x + 1$. If any zeros have a multiplicity of 2 or more, state so.

Complete factorization: $P(x) =$ _____

Zeros: _____

7. Let $f(x) = \frac{x+1}{2x^2+3x-2}$.

a) (1 point) Find the domain of f.

Domain: _____

b) (1 point) Find the x-intercept(s) and y-intercept of f (if any).

x-intercept(s): _____

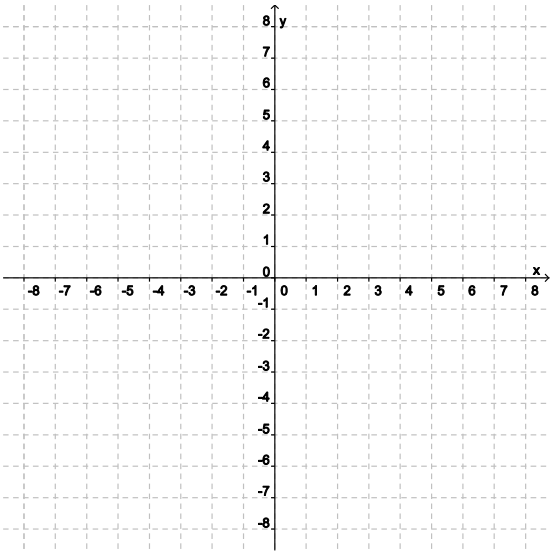
y-intercept: _____

c) (3 points) Find all vertical asymptotes of f. Also, be sure to show your analysis on each side of each vertical asymptote (you can write these as in class—for example: "As $x \to 1^-$, $y \to \infty$").

Vertical asymptotes: _____

As $x \to$ ____, $y \to$ _____ As $x \to$ ____, $y \to$ _____

As $x \to$ ____, $y \to$ _____ As $x \to$ ____, $y \to$ _____



d) (1 point) Find the horizontal asymptote of f.

Horizontal asymptote: $y =$ _____

e) (2 points) Sketch the graph of f. Be sure to draw all asymptotes.

8. (2 points) Solve $\frac{x+3}{x^2-x-2} < 0$.

Answer: _____

9. (0 points) How many hours of sleep did you get last night? _____

Note: Be sure to double-check your work. And don't forget to turn in your homework! ☺