

Exam 2

Name _____

Math 143

March 26, 2003

Show all work and simplify all answers. If you use your calculator to arrive at a conclusion, state what you did on your calculator. Box your final answers. There are 4 pages and 100 points: budget your time on each problem effectively.

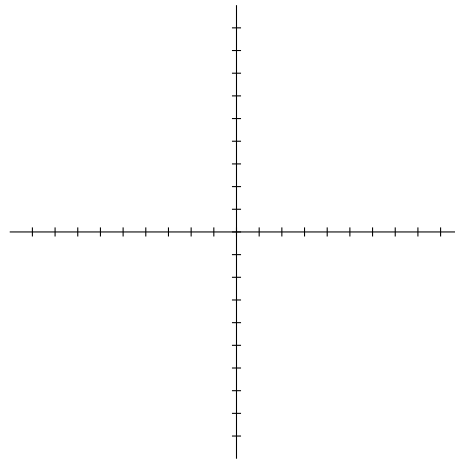
1. [6 points] Label each of the functions below as “polynomial,” “rational function,” or “neither.”
 - (a) $f(x) = (2 - x)/(2 + x)$
 - (b) $f(x) = x^2 + 3x^4/5$
 - (c) $f(x) = 2^x + 3x^4$

2. [10 points] A factory owner buys a new machine for \$1000. After five years, the machine has a salvage value of \$100. Assuming linear depreciation, find a formula for the value V of the machine after t years, where $0 \leq t \leq 5$.

3. [13 points] Let $y = -2x^2 - 12x - 14$.

- (a) [6 points] Put the equation in standard form by completing the square.

- (b) [5 points] Graph the equation.



- (c) [2 points] What is the vertex of $y = -2x^2 - 12x - 14$? _____

4. [12 points] A rectangle has height h and width w . Its area is 100 cm^2 . Express the perimeter p of the rectangle as a function of w .

5. [13 points] Suppose that a baseball is tossed straight up and that its height as a function of time is given by the formula

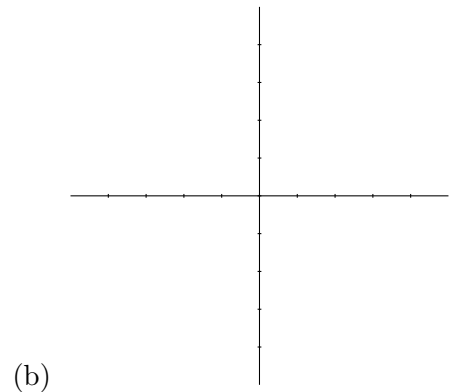
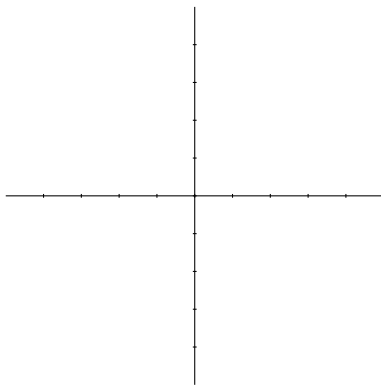
$$h = -16t^2 + 64t + 6$$

In this formula, h is measured in feet and t in seconds, with $t = 0$ corresponding to the instant that the ball is released.

- (a) [10 points] What is the maximum height of the ball?

- (b) [3 points] When does the ball reach that height?

6. [8 points] In parts (a) and (b), give a reason why the graph can not represent a polynomial function of degree 3.



7. [18 points] Let $g(x) = (x - 2)(x + 3)^2$.

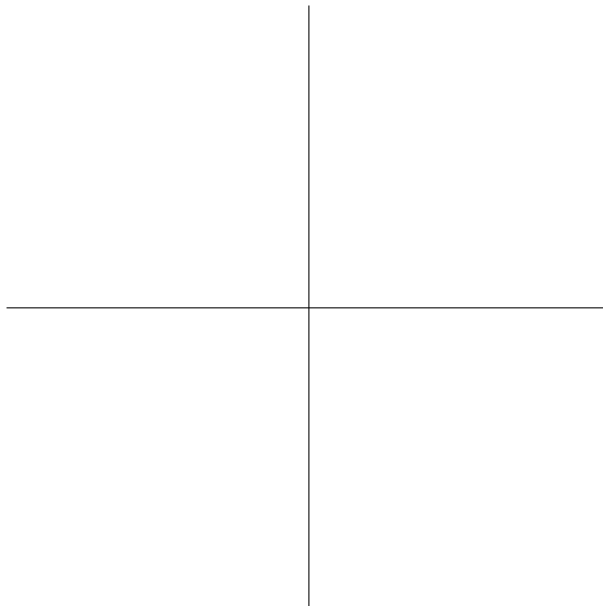
(a) [3 points] Find the x -intercepts.

(b) [2 points] Find the y -intercept.

(c) [5 points] Do a sign analysis. Either show your table, or indicate which test points you used on your number line.

(d) [4 points] Describe the behavior of the function at each x -intercept. Specify your results with a sketch.

(e) [4 points] Graph g . Shade in the excluded regions on your graph. Add tick marks on the axes to indicate scale.



8. [21 points] Let $g(x) = \frac{3x - 2}{x + 3}$.

(a) [3 points] What is the domain of g ?

(b) [3 points] Find the x -intercepts.

(c) [2 points] Find the y -intercept.

(d) [4 points] Do a sign analysis. Either show your table; or indicate which test points you used on your number line.

(e) [2 points] List all vertical asymptotes.

(f) [3 points] List all horizontal asymptotes and slant asymptotes for g :

(g) [4 points] Graph g . Shade in the excluded regions on your graph. Add tick marks on the axes to indicate scale.

