

MAT 201  
Assignment 7  
Tuesday, March 24, 2015

For full credit on these problems, each must be submitted with a complete and clear solution, showing all of your work. You may work with other classmates on these problems, but please indicate on your assignment if you received help. Partial answers and incomplete solutions may be eligible for some partial credit, depending on the level of completeness and demonstrated understanding.

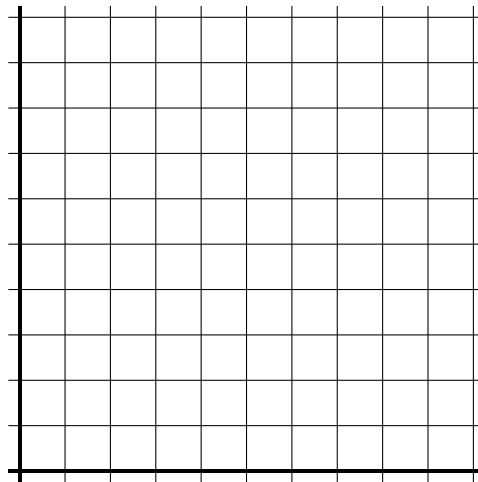
1. Find the derivatives of the following functions

- (a)  $f(x) = 3x^{11} - 4x^7 + 2x^2 + x - 5$
- (b)  $f(x) = 4e^x + 6\cos x - 9\sin x + 11$
- (c)  $f(x) = \frac{x^4 + x^3 + 2x^2 + 1}{\sqrt{x}}$
- (d)  $f(x) = \sin x \cos x$
- (e)  $f(x) = \frac{5x+1}{x^2+x-1}$
- (f)  $f(x) = 5\tan x + 6x \sec x - 2x^2 \csc x$
- (g)  $f(x) = x^3 e^x$

2. Consider the function

$$f(x) = \frac{4x}{x^2 + 6}.$$

- (a) Find an equation of the tangent line to the graph of  $y = f(x)$  when  $x = 2$ .
  - (b) Find all points on the graph that have a horizontal tangent line.
3. An object is thrown upward over the edge of a 100 meter cliff with an initial velocity of 20  $m/s$ .
- (a) Determine the position and velocity functions of the object.
  - (b) Determine the average velocity on the interval  $[2, 3]$ .
  - (c) Determine the instantaneous velocity when  $t = 2$  and  $t = 3$ .
  - (d) Find the time required for the object to reach the ground.
  - (e) Find the velocity of the object at impact.
4. The following graph represents the distance, in miles, that a person drives over a 10 minutes trip to work. That is, the horizontal axis is measured in minutes, and the vertical axis is measured in miles.



- (a) What is the velocity of the car when  $t = 2$  minutes? When  $t = 5$  minutes?
- (b) Draw a sketch of the corresponding velocity function over the 10 minute interval.
- (c) Write an possible scenario which would correspond to the two graphs drawn.