NAME : ____________________

SECTION : (circle one) 12:30–1:35 1:45–2:50

Math 8

due Monday, January 11, 2010

Homework #1 — covers Lectures 1–3

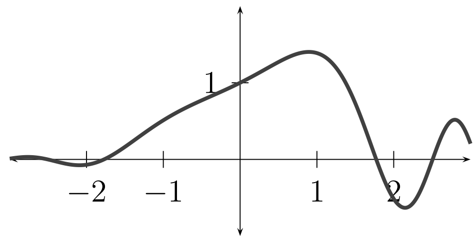
INSTRUCTIONS: Collaboration on homework is encouraged. The use of computing devices is allowed on homework (but *not* on exams). Please feel free to attach extra pages if your solutions require them. A correct answer with incorrect work will be considered wrong.

FERPA RELEASE: Because of privacy concerns, we are not allowed to return your graded homework in lecture without your permission. If you wish us to return your homework in lecture, please sign on the line indicated below. Otherwise, you will have to pick your homework up in your instructor's office.

SIGN HERE: ____.

Problem	Points	Score
1	4	
2	4	
3	4	
Total	12	

1. (4) Explain why none of the given polynomials are the Taylor polynomials of the function shown below.



(a) $\frac{1}{2} + \frac{x}{2} + \frac{x^2}{8}$ (centered at 0)

(b) $1.4 - 0.3(x-1) + 1.6(x-1)^2$ (centered at 1)

(c) $0.5 - 0.6(x+1) - 0.2(x+1)^2$ (centered at -1)

2. (4) In using Taylor polynomials to approximate a function $f(x)$ we need to choose the center, a, to be near x, but we also need to be able to compute f and its derivatives at a.

(a) What Taylor polynomial of degree 4 would you use to approximate the function $f(x) = \cos x$ at $x = 10$? (That is, first, which center would you choose, and then what Taylor polynomial would you get?)

(b) Use the Remainder Theorem to give an upper bound on the error in this approximation.

3. (4) Define the sequence $\{a_n\}$ recursively by

$$a_{n+1} = \frac{3 + 3a_n}{3 + a_n}.$$

Show that if $a_1 = 1$ then $\{a_n\}$ is monotonically increasing, while if $a_1 = 2$ then $\{a_n\}$ is monotonically decreasing.