Name: _____
TA's Name: _____
Recitation Day/Time: _____

Math 165: Midterm v.1

Part II

Spring 2013

This part of the exam has 7 problems; each problem is worth 10 points.

Answer each question completely. Show all work. No credit is allowed for mere answers with no work shown. Show the steps of calculations. State the reasons that justify conclusions

Question 1: _____

Question 2: _____

Question 3: _____

Question 4: _____

Question 5: _____

Question 6: _____

Question 7: _____

70 **Total Points:** _____

Question 1 (10 points, 1.6). *Why must* $\sin(1/x)$ *have a zero between* $x = .01$ *and* $x = .001$*?*

Question 2 (10 points, 2.6). *If an object has position function* $s(t) = \frac{1}{2}t^4 - 5t^3 + 12t^2$*, find the object's velocity when its acceleration is zero.*

Question 3 (10 points, 2.6)**.** *An object is thrown directly upward from ground level, with an initial velocity of* 48 *feet per second. The object is* $s = 48t - 16t^2$ *feet high at the end of* t *seconds.*

(a) *What is the maximum height attained by the object?*

(b) *How fast is the object moving at the end of one second?*

Question 4 (10 points, 2.8)**.** *A spherical balloon is expanding from the sun's heat at a constant rate of* 10 *cubic meters per hour. How fast is its radius increasing when, when the radius is* 5 *meters?*

Question 5 (10 points, 3.1)**.** *Identify all critical points, and the maximum and minimum values on the interval provided:*

$$f(x) = \frac{1}{1+x^2}, \text{ on the interval } [-3, 1]$$

Question 6 (10 points, 3.2)**.** *Find the intervals on which f is increasing, and on which f is concave down:*

$$f(x) = x^4 - 4x^5$$

Question 7 (10 points, 3.2)**.** *Find all inflection points of the function on the interval* $[0, 2\pi]$*:*

$$f(x) = \sin x - \tan x$$