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

Math 165: Final v.1

Part I

Spring 2013

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

You may **NOT** use a calculator on this section. You must show all work, but you need not simplify your answers. This part of the exam will be collected after 70 minutes.

Question 1: _____

Question 2: _____

Question 3: _____

Question 4: _____

Question 5: _____

Question 6: _____

Question 7: _____

Question 8: _____

Question 9: _____

Question 10: _____

100 **Total Points:** _____

Question 1 (10 points)**.** *Given* $f(x) = 5x^3 - 3x^5$*:*

(a) *Find all values of* x *such that* $f'(x) = 0$*.*

(b) *Find all critical points.*

(c) *Find the intervals where* f *is increasing and where* f *is decreasing.*

(d) *Find all local maxima and local minima.*

Question 2 (10 points)**.** *Find the following antiderivative:*

$$\int x^4 \sqrt[3]{5 - x^5}\, dx$$

Question 3 (10 points)**.** *Using the fact that* $f'(x) = (x-4)(x-2)x$*, sketch a possible graph of* $f(x)$*.*

Question 4 (10 points)**.** *Evaluate* $\int x^4 \sin(x^5 + 2)\, dx$.

Question 5 (10 points)**.**

(a) *Find the average value of the function* $f(x) = \dfrac{x}{\sqrt{x^2+16}}$ *on the interval* $[0,\ 3]$.

(b) *Find all values of* c *that satisfy the Mean Value Theorem for Integrals for the integral in (a).*

Question 6 (10 points)**.** *Find the derivative of*

$$f(x) = \ln(5x^4 + 3x^3 + 2x + 4)$$

Question 7 (10 points)**.** *Find the antiderivative:*

$$\int \frac{28x+6}{7x^2+3x}\,dx$$

Question 8 (10 points)**.** *Find the derivative:*

$$y = e^{\sqrt{x-10}}$$

Question 9 (10 points)**.** *Evaluate the integral:*

$$\int_3^4 5^t \, dt$$

Question 10 (10 points)**.** *Find the antiderivative:*

$$\int \frac{e^x}{e^{2x}+1}\,dx$$