Name: _____

Section #: _____

Math 165: Midterm — Part 1
Fall 2014

This part of the exam has 7 problems for a total of 42 possible points. Each problem is worth 6 points.

You may **NOT** use a calculator on this section. You must show all work, but you need not simplify your answers unless instructed to do so. This part of the exam will be collected after 40 minutes.

Question 1: _____

Question 2: _____

Question 3: _____

Question 4: _____

Question 5: _____

Question 6: _____

Question 7: _____

42 **Total Points:** _____

Question 1. Let
$$g(t) = 2t^3 - \frac{1}{2}t^2 + 3\sqrt[3]{t} + \frac{16}{t}.$$
Find the value of $g'(8)$. Your answer should be in simplest form.

Question 2. The function $h(\theta)$ is defined by

$$h(\theta) = \begin{cases} (\theta^2 + 1)\ln(2\theta^2 + 2) & \theta < -2 \\ \\ \dfrac{\sin(3\theta)}{2\theta} & -2 \leq \theta < 0 \\ \\ 3/2 & \theta = 0 \\ \\ \dfrac{3\theta}{\cos(2\theta)} & \theta > 0 \end{cases}$$

Evaluate $\lim_{\theta \to 0} h(\theta)$ or give reasons why the limit does not exist.

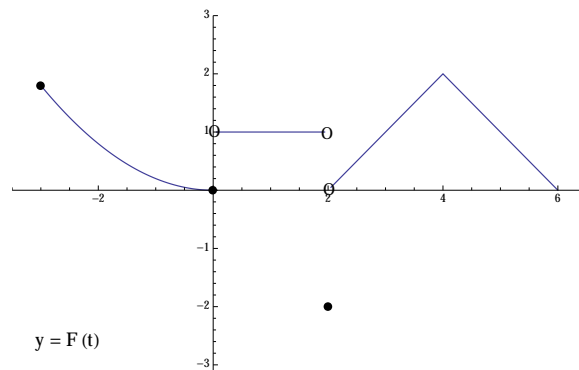**Question 3.** Calculate $\dfrac{dy}{dx}$, with $y = e^{2x}\cos(3x)$.

Question 4. Evaluate
$$\lim_{r \to 3} \frac{r^2 - 9}{\sqrt{r} - \sqrt{3}}$$
or give reasons why the limit does not exist.

Question 5. Find the equation of the line tangent to the graph of $y = \dfrac{2\ln x}{x^2 + 1}$ at the point on the graph with $x = 1$.

Question 6. The graph $y = F(t)$ of a function F is shown below. Evaluate $\lim\limits_{t \to 4} \left((2t^2 - 3)F(t) \right)$ or give reasons why the limit does not exist.

y = F (t)

Question 7. Assume the expression $x^3 - 5x^2y^2 + 2y^3 + 5 = 0$ defines y as a function of x. Find the value of $\dfrac{dy}{dx}$ at the point $(-1, 2)$.