Math 191 Section X03
Test Two

Time: 50 minutes

Total: 25 marks

Name: _____

1. [4 marks] Find y':

a) $y = \frac{1}{3}\csc 6x^2$

b) $y = 3\cos^4 \frac{x}{6}$

2. [2 marks] We want to approximate a solution to $3x^4 - 4x^3 - 5 = 0$.
Use $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ with $x_0 = -1$ to find x_1.
Round x_1 to two decimal places. You do **not** need to find x_2.

3. [4 marks] An object's position (in m) after t seconds is given below. Find the magnitude and direction of the object's velocity at $t = 2$ seconds. Round your values to one decimal place.

$$x = 1 - 3t^3, \quad y = 1 + 2t^2$$

4. [4 marks] When a spherical balloon is inflated, its volume increases by 360π cm^3/s. At what rate is the radius increasing when the radius is 3 cm? Hint: $V = \frac{4}{3}\pi r^3$.

5. [4 marks] Let $f(x) = 15x^3 - x^5$. For which x-values is $f(x)$ increasing?

6. [3 marks] Let $f = 6x^4$. Find $\frac{df}{f}$ given that $\frac{dx}{x} = 0.03$.

7. [4 marks] Find the value of r that minimizes $f = 2\pi r^2 + 2\pi rh$, given that $r^2h = 16$. You do **not** need to verify that your answer is a minimum.