Math 191 Test Two

Time: 50 minutes

Total: 25 marks

Name: _____

1. [4 marks] Find y':

a) $y = 4\cos^3 \frac{x}{2}$

b) $y = \frac{1}{4}\csc 8x^2$

2. [4 marks] Find the equation of the tangent line to $y = \frac{16}{x} - 12\sqrt{x}$ at $x = 4$. You do not need to simplify your answer.

3. [3 marks] Let $f(x) = -x^3 + 9x^2 - 24x + 5$. For which x-values is $f(x)$ decreasing?

4. [4 marks] An object's position (in m) after t seconds is:

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

Find the magnitude and direction of the object's velocity at $t = 2$ seconds. Round your values to one decimal place.

5. [3 marks] When a spherical balloon is inflated, its volume increases by 180π cm^3/s. At what rate is the radius increasing when the radius is 3 cm? Hint: $V = \frac{4}{3}\pi r^3$.

6. [4 marks] Find the value of r that minimizes $f = 2\pi r^2 + 2\pi r h$, given that $r^2 h = 128$.

7. [3 marks] Let $f = 12x^3$. Find $\frac{df}{f}$ given that $\frac{dx}{x} = 0.08$.