Quiz 4 Solution - Math 165

Name: _____

Show all work to receive maximum credit for each problem. You may not use your book, notes, or a calculator on this quiz. Give exact answers, not decimal approximations. This quiz is worth 25 points.

1. (5 points) Find $\frac{d^2y}{dx^2}$ if $y = \frac{3}{4}x^4 - \frac{1}{2}x^3 + 2\pi x - 4$.

Solution: $\frac{dy}{dx} = 3x^3 - \frac{3}{2}x^2 + 2\pi \Rightarrow \frac{d^2y}{dx^2} = 9x^2 - 3x$

2. (5 points) Evaluate $D_x[\cos(x^2)]$

Solution: $D_x[\cos(x^2)] = -\sin(x^2)2x = -2x\sin(x^2)$

3. (5 points) Evaluate $D_x[\sin^2(3x)]$

Solution: $D_x[\sin^2(3x)] = 2\sin(3x)\cos(3x)3 = 6\sin(3x)\cos(3x)$

4. (5 points) An object moves along a line with position $s(t) = \frac{1}{6}t^3 - \frac{1}{2}t^2 - 6t + \frac{1}{2}$. Find all times at which the acceleration of the object is zero.

Solution: $v(t) = s'(t) = \frac{1}{2}t^2 - t - 6 \Rightarrow a(t) = s''(t) = t - 1 = 0 \Rightarrow t = 1$

5. (5 points) Find $\frac{dy}{dx}$ using implicit differentiation if $y^2 + xy = 10x$.

Solution: $\frac{d}{dx}(y^2 + xy) = \frac{d}{dx}(10x) \Rightarrow 2y\frac{dy}{dx} + y + x\frac{dy}{dx} = 10 \Rightarrow \frac{dy}{dx} = \frac{10 - y}{2y + x}$