Math 142
Spring, 2005 Name: **Solutions**
Quiz 11 - §§P.6, 2.5, 2.6

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Complete the following problems. Show all work to receive full credit.

1. Find a parametrization of the straight line path from the point $(2,4)$ to $(-2,3)$ which takes two seconds to complete.

   Remember that the parametric equations will look like

   $$x(t) = at + b \qquad y(t) = ct + d$$

   At time $t = 0$ we have $x = 2$ and $y = 4$:

   $$2 = a(0) + b \qquad 4 = c(0) + d$$

   $$b = 2 \qquad d = 4$$

   so

   $$x(t) = at + 2 \qquad y(t) = ct + 4$$

   At time $t = 2$ we have $x = -2$ and $y = 3$:

   $$-2 = a(2) + 2 \qquad 3 = c(2) + 4$$

   $$-2 = 4a \qquad -1 = 2c$$
   $$-\frac{1}{2} = a \qquad -\frac{1}{2} = c$$

   Therefore the parametrization is

   $$x(t) = -\frac{1}{2}t + 2 \qquad y(t) = -\frac{1}{2}t + 4 \qquad 0 \leq t \leq 2$$

2. If $x = \cos t$ and $y = \sqrt{3}\cos t$, find $\dfrac{dy}{dx}$.

   $$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{-\sqrt{3}\sin t}{-\sin t} = \sqrt{3}$$

3. Find $\dfrac{d}{dx}\left(x^2 \sin^4 x\right)$

   $$= 2x \cdot \sin^4 x + 4x^2 \sin^3 x \cdot \cos x$$

4. Find $\frac{dy}{dx}$ where $x^2y + yx^2 = 6$.

$$2xy + x^2\frac{dy}{dx} + \frac{dy}{dx}x^2 + 2xy = 0$$

$$\frac{dy}{dx}\left(x^2 + x^2\right) = -2xy - 2xy$$

$$\frac{dy}{dx} \cdot 2x^2 = -4xy$$

$$\frac{dy}{dx} = \frac{-4xy}{2x^2}$$

$$\frac{dy}{dx} = \frac{-2y}{x}$$