Math 2 Winter 2006 Quiz 1

Name: Key Section: ____________

1. Find the **equation of the tangent line** to $y = x^3 + 5x - 7$ at the point $(1, -1)$.

$y' = 3x^2 + 5$

$m = y'$ evaluated at point $(1,-1)$

$= 3(1)^2 + 5 = 8$.

equation of tangent line is

$$\left.\begin{aligned} y &= mx + b \\ y &= 8x + b \\ (-1) &= 8(1) + b \\ \Rightarrow b &= -9 \end{aligned}\right\} \longrightarrow y = 8x - 9$$

$y =$ $8x - 9$

2. Let $f(x) = \sin(\pi x^2 + \frac{\pi}{2}x)$.

(a) Find $f'(x)$. $= \left(\cos(\pi x^2 + \frac{\pi}{2}x)\right)\left(2\pi x + \pi/2\right)$.

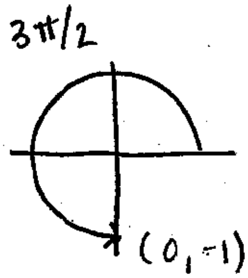
$f'(x) =$ $(2\pi x + \pi/2)\cos\left(\pi x^2 + (\pi/2)x\right)$

(b) Find $f'(1)$. $= \left(2\pi(1) + \pi/2\right) \cdot \cos\left(\pi(1)^2 + \frac{\pi}{2}(1)\right)$

$$= \left(\frac{5\pi}{2}\right) \cdot \cos\left(3\pi/2\right)$$

$$= \frac{5\pi}{2} \cdot (0)$$

$f'(1) =$ 0



so $\cos(3\pi/2) = 0$.

3. Evaluate $\int (3\sqrt{x} + 5x^4 - \sin(x))\,dx$.

$$= 3\int x^{1/2}dx + 5\int x^4 dx - \int \sin(x)\,dx$$

$$= \frac{3x^{3/2}}{3/2} + \frac{5x^5}{5} - (-\cos(x)) + C$$

$$= 2x^{3/2} + 1x^5 + \cos(x) + C$$

$2x^{3/2} + 1x^5 + \cos(x) + C$

4. Solve the differential equation $f'(x) = 5e^x - 2$ subject to the initial condition $f(0) = 8$.

$$f(x) = \int (5e^x - 2)\,dx$$

$$= 5e^x - 2x + C$$

$$f(0) = 8$$

$$5e^0 - 2(0) + C = 5 + C$$

$$\Rightarrow C = 3$$

$f(x) =$ $5e^x - 2x + 3$