WARMUP

Find $f'(x)$

1) $f(x) = \sqrt{8x+1}$

$f(x) = (8x+1)^{\frac{1}{2}}$

$f'(x) = \frac{1}{2}(8x+1)^{-\frac{1}{2}} \cdot 8$

$f'(x) = \frac{4}{(8x+1)^{\frac{1}{2}}} = \frac{4}{\sqrt{8x+1}}$

$\frac{d}{dx}[e^{kx}] = ke^{kx}$

2) $g(x) = \ln x - 7e^{6x} + e^{e}$

$g'(x) = \frac{1}{x} - 7 \cdot 6e^{6x} + 0$

$g'(x) = \frac{1}{x} - 42e^{6x}$

PRACTICE TEST SOLUTIONS

1) $f'(x) = 25x^4 - 28x^3 + 1$

2) $y' = 3\cos x - \frac{1}{x}$

3) $f(x) = x^6 e^{4x}$

$f'(x) = x^6 \cdot 4e^{4x} + e^{4x} \cdot 6x^5$

$f'(x) = \frac{4x^6 e^{4x}}{2 x^5 e^{4x}} + \frac{6x^5 e^{4x}}{2 x^5 e^{4x}}$

$2x^5 e^{4x}(2x+3)$

4) $g'(x) = \frac{59}{(8x+5)^2}$

5) $f(x) = \sin^8(2x+7)$

$f'(x) = 8\sin^7(2x+7) \cdot \underbrace{\cos(2x+7)\cdot 2}_{\frac{d}{dx}(\sin(2x+7))}$

$f'(x) = 16\sin^7(2x+7)\cos(2x+7)$

6) $y = 4x^2 \ln x$

$y' = 4x^2 \cdot \frac{1}{x} + \ln x \cdot 8x$

$y' = \frac{4x}{4x} + \frac{8x}{4x}\ln x$

$y' = 4x\left(1 + 2\ln x\right)$

7) $f'(x) = \pi^x \ln \pi - \pi x^{\pi - 1}$

8) $y' = 54x\left(3x^2 - 8\right)^8$

9) $g(x) = x^4 \cos(5x)$

$g'(x) = x^4\left(-\sin(5x)\cdot 5\right) + \cos(5x)\cdot 4x^3$

$g'(x) = -5\frac{x^4}{x^3}\sin(5x) + 4\frac{x^3}{x^3}\cos(5x)$

$g'(x) = x^3\left(-5x\sin(5x) + 4\cos(5x)\right)$

10) $y' = \dfrac{3x^5 \cdot \cos(4x) \cdot 4 - \sin(4x) \cdot 15x^4}{(3x^5)^2}$

$y' = \dfrac{12x^5\cos(4x) - 15x^4(\sin(4x))}{9x^{10}}$

$y' = \dfrac{3x^4(4x\cos(4x) - 5\sin(4x))}{9x^{10}}$

$y' = \dfrac{4x\cos(4x) - 5\sin(4x)}{3x^6}$

11) $f(x) = 5x^2 - 3x$ at $x = 1$

$f'(x) = 10x - 3$

$m = f'(1) = 10 \cdot 1 - 3 = 7$

POINT: $f(1) = 5 \cdot 1^2 - 3 \cdot 1 = 2$

$(1, 2)$

EQ: $2 = 7 \cdot 1 + b$

$-5 = b$

$y = 7x - 5$

12) $f(x) = \ln(ex^4)$

SLOPE: $f'(x) = \dfrac{1}{ex^4} \cdot \dfrac{4ex^3}{1} = \dfrac{4ex^3}{ex^4}$

$f'(x) = \dfrac{4}{x}$

POINT: $y = \ln(e \cdot e^4)$

$y = \ln(e^5)$

$y = 5$

$m = f'(e) = \frac{4}{e}$ $(e, 5)$

EQ: $5 = \frac{4}{e}e + b$

$1 = b$

$y = \frac{4}{e}x + 1$

$e \cdot e^4 = e \cdot e \cdot e \cdot e \cdot e = e^5$

$\ln(e^x) = x$

PPP Find derivatives in 1-6:

1) $f(x) = 8e^{-3x} - \ln x + \sqrt{2}^{\pi}$

2) $y = \sqrt{13 - 8x}$

3) $f(x) = \frac{6x+1}{4x-7}$

4) $g(x) = \frac{\cos x}{10x^3}$

5) $y = 8x^4 e^{7x}$

6) $f(x) = \cos^{10}(3x+2)$

7) Find eq of tan line to f(x) at x-value:

a) $f(x) = (4x^2 - 3)^3$ at $x = -2$

b) $f(x) = 8\ln(x^7)$ at $x = e$

Ch 3 Extra Credit due Friday beginning of class

p159 – 160 4, 18, 34, 52, 60