Pledge:

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Dr. Lunsford

MATH261 Calculus I
Quiz 7

Name: Solution
(20 Points Total)

I. Find the indicated derivatives. You are NOT required to simplify your answers. (4 points each, 16 total)

(a) $f(x) = \frac{1}{x^4}\left(e^x - x^2\sin(x)\right) = x^{-4}(e^x - x^2\sin(x)) = x^{-4}e^x - x^{-2}\sin(x)$

$f'(x) =$ ① OR $\frac{x^4(e^x - 2x\sin(x) - x^2\cos(x)) - 4x^3(e^x - x^2\sin(x))}{x^8}$ = ② Product Rule

$-4x^{-5}(e^x - x^2\sin x) + x^{-4}(e^x - 2x\sin(x) + x^2\cos(x))$

(b) $g(t) = \pi^4\sqrt{t^5}\sec(t) = \pi^4 t^{5/2}\sec(t)$

$\frac{d}{dt}g(t) = \pi^4 \frac{5}{2} t^{3/2}\sec(t) + \pi^4 t^{5/2}\sec(t)\tan(t)$ = ③ SUM/PR $-4x^{-5}e^x + x^{-4}e^x + 2x^{-3}\sin(x) - x^{-2}\cos(x)$

(c) $l(x) = \frac{x^2e^x - \cos(x)}{3x^4 - 2x + 1}$

$l'(x) =$ OR $\frac{[2xe^x + x^2e^x + \sin x](3x^4 - 2x + 1) - (x^2e^x - \cos(x))(12x^3 - 2)}{(3x^4 - 2x + 1)^2}$

(d) ① $p(y) = \frac{10e^y\tan(y)}{y^3}$ ② $= 10y^{-3}e^y\tan(y)$

$\frac{dp}{dy} =$ ① $\frac{(10e^y\tan(y) + 10e^y\sec^2(y))y^3 - (10e^y\tan(y))3y^2}{y^6}$

② $\frac{dy}{dx} = 10(-3y^{-4})e^y\tan y + 10y^{-3}e^y\tan y + 10y^{-3}e^y\sec^2 y$

II. Below you are given the graph of $y = \frac{1-x}{1+x}$. Find the equation of and accurately graph the tangent line to the graph at $x = 0$.

$$\frac{dy}{dx} = \frac{(-1)(1+x) - (1-x)(1)}{(1+x)^2}$$

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

$\left.\frac{dy}{dx}\right|_{x=0} = -2$ ← slope

@ $x=0$, $y = \frac{1-0}{1+0} = 1$ → point on line: $(0,1)$

$y - 1 = -2(x-0)$

$y = -2x + 1$