MATH 131
Quiz III
October 8, 1987 Name KEY Time 01c (20 min)

1. $f(x) = (x^3 - 7x + 3)(x^3 - \sqrt{x})$. $= (x^3 - 7x + 3)(x^3 - x^{1/2})$

$f'(x) = (x^3 - 7x + 3)(3x^2 - \frac{1}{2}x^{-1/2}) + (x^3 - x^{1/2})(3x^2 - 7)$

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4

2. $f(x) = \frac{\cos x}{1 + \sin x}$. $= \cos x (1 + \sin x)^{-1}$

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

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

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

3. $y = (x^4 - \frac{2}{x})^{27}$.

$\frac{dy}{dx} = 27(x^4 - \frac{2}{x})^{26}(4x^3 + 7/x^2)$
$(4x^3 - 7(-x^{-2}))$

4. $\frac{d}{dx} \sin(x^2 - 7) = \cos(x^2 - 7)(2x)$
$= 2x \cos(x^2 - 7)$

5. $g(x) = \sqrt{\cos(3x)} = (\cos 3x)^{1/2}$

$g'(x) = \frac{1}{2}(\cos 3x)^{-1/2}(-\sin 3x \cdot 3)$

$= \frac{-3 \sin 3x}{2\sqrt{\cos 3x}}$

6. $f(x) = x\sqrt{\sin x}$ $x(\sin x)^{1/2}$

$f'(x) = x(\frac{1}{2})(\sin x)^{-1/2}\cos x + \sqrt{\sin x}$

$= \frac{x \cos x}{2\sqrt{\sin x}} + \sqrt{\sin x}$

7. Find the second derivative of $\frac{1}{x^2} - \tan x$. $= x^{-2} - \tan x$

$\frac{dy}{dx} = -2x^{-3} - \sec^2 x$ $\frac{d^2y}{dx^2} = +6x^{-4} - 2\sec x \sec x \tan x$

$= +\frac{6}{x^4} - 2\sec^2 x \tan x$

8. Find the equation of the tangent line to $y = \frac{x}{x+2}$, at the point $(-1, -1)$.

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

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

$y + 1 = 2(x + 1)$

$y = 2x + 2 - 1$

$y = 2x + 1$