MATH 151
Mrs. Bonny Tighe

QUIZ 3
3.3-3.5
25 points

NAME Answers

SECTION _____ Fri 2/24/06

1. Find dy/dx or f'(x). a) $f(x) = 3x^3 - 2x + \frac{1}{x^2} + 4$ $= 3x^3 - 2x + x^{-2} + 4$

$f'(x) = 9x^2 - 2 - 2x^{-3} + 0 = 9x^2 - 2 - \frac{2}{x^3}$

b) $f(x) = x^2\sqrt{x} - \frac{2}{x\sqrt{x}}$ $= x^{5/2} - 2x^{-3/2}$

$f'(x) = \frac{5}{2}x^{3/2} - 2\left(-\frac{3}{2}\right)x^{-5/2} = \frac{5}{2}x^{3/2} + \frac{3}{x^{5/2}}$

c) $y = \frac{3\cos x - 2x^2}{\sin x - \tan x}$ $dy/dx = \frac{(\sin x - \tan x)(-3\sin x - 4x) - (3\cos x - 2x^2)}{(\sin x - \tan x)^2}$

$dy/dx = \frac{(\sin x - \tan x)(-3\sin x - 4x) - (3\cos x - 2x^2)(\cos x - \sec^2 x)}{(\sin x - \tan x)^2}$

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

$f'(x) = (3x^2 - \sec x)(-3x^{-4} + 2) + (x^{-3} + 2x)(6x - \sec x \tan x)$

$= (3x^2 - \sec x)\left(\frac{-3}{x^4} + 2\right) + \left(\frac{1}{x^3} + 2x\right)(6x - \sec x \tan x)$

$f'(x) = -\sin x - \sec^2 x$

2. If f(x) = cosx - tanx, find the following:

a) $f(\pi/3) = \frac{1}{2} - \sqrt{3}$ b) $f(\pi/4) = \frac{\sqrt{2}}{2} - 1$ c) $f'(\pi/4) = \frac{-\sqrt{2}}{2} - 2$ d) $f'(\pi) = -1$

$\cos \pi/3 - \tan \pi/3$ $\quad \cos \pi/4 - \tan \pi/4$ $\quad -\sin \pi/4 - (\sec \pi/4)^2 = -\sqrt{2}/2 - (\sqrt{2})^2$

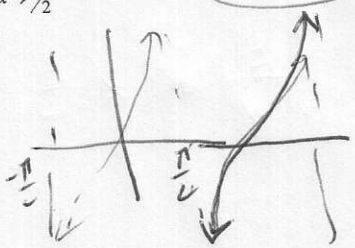
$1/2 - \sqrt{3}$ $\quad \sqrt{2}/2 - 1$

$-\sin \pi - (\sec \pi)^2 = -0 - (-1)^2 = -1$

3. Find the limit.

a) $\lim_{x \to 0} \frac{\sin 3x}{3x} = 3$ b) $\lim_{\alpha \to 0} \frac{1 - \cos \alpha}{\sin 5\alpha} = 0$ c) $\lim_{x \to \pi/2^+} (\tan x) = -\infty$

$\frac{3}{1}$



4. Find an equation of the tangent to the curve $y = x(3\sqrt{x} - x)$ at the point (4, 8).

$y = 3x^{3/2} - x^2$

$dy/dx = 3 \cdot \frac{3}{2} x^{1/2} - 2x$

$\frac{9}{2}\sqrt{x} - 2x$ $\quad$ at $x = 4$

$\frac{9}{2}\sqrt{4} - 2(4)$

$9 - 8 = 1 = m$

$y - y_1 = m(x - x_1)$

$y - 8 = 1\,(x - 4)$

$y = x + 4$

5. If

$f(2) = 1$, $f'(2) = 3$, $g(2) = 2$ *and* $g'(2) = -1$, *find the following* :

a) $(f - g)'(2) = 4$ b) $(f/g)'(2) = 7/4$ c) $\left(\frac{g}{f+g}\right)'(2) = -7/9$

$f'(2) - g'(2)$

$3 - (-1) = 4$

b) $\frac{g(2)f'(2) - f(2)g'(2)}{(g(2))^2} = \frac{2(3) - 1(-1)}{(2)^2} = \frac{6+1}{4}$

c) $\frac{(f+g)(2)\,g'(2) - g(2)(f+g)'(2)}{((f+g)(2))^2} = \frac{(1+2)(-1) - (2)(3+-1)}{(1+2)^2} = \frac{-3-4}{9} = \frac{-7}{9}$