Math 211 Test # 2 Material (Test Date: July 20, 2010)

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SECTION  PROBLEMS(odd)
2.4 7-35,45-73,91-99
2.5 1-39, 45-51
3.1 11-35
3.2 11-23, 39-47
3.3 17-21
3.4 19-23
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1. Find the derivative $\frac{dy}{dx}$ for the following functions:
   (a) $y = \frac{12}{x} - \frac{4}{x^3} + \frac{1}{x^4}$
   (b) $y = \sqrt{x} + \frac{1}{\sqrt{x}}$
   (c) $y = \frac{4-x}{3+x}$
   (d) $y = x \sin x$
   (e) $y = (\sin x)(\cos x)$
   (f) $y = \tan x - x$
   (g) $y = \frac{\tan x}{1+\tan x}$
   (h) $y = (\sin x + \cos x) \sec x$
   (i) $y = (1 + \csc x) \cos x$
   (j) $y = 4 - x^2 \sin x$
   (k) $y = \sec x \csc x$
   (l) $y = \frac{\cos x}{1+\cos x}$
   (m) $y = (x + 2)^8(x + 3)^6$
   (n) $y = \frac{x}{\sqrt{9-x}}$
   (o) $y = \sec(2x)$
   (p) $y = \csc^5(2x^2)$
   (q) $y = \sqrt[5]{x \tan x}$
   (r) $y = \cot(3x^2 + 5)$
   (s) $y = \cos(\tan x)$
   (t) $y = (1 + \cos^2 x)^6$
   (u) $y = \frac{\cos^2 x}{\sin x}$
   (v) $y = \sin \sqrt{x}$
   (w) $y = \sqrt{x^2 - 7x}$
   (x) $y = \sin^3 x^2$
   (y) $y = \sqrt{x + \sqrt{x}}$
2. Find an equation for the tangent line to the given function at the indicated point:
   (a) $y = \frac{x}{x^2-2}$; (2,1)
   (b) $y = \sqrt{x}$; (4,2)
   (c) $y = \tan x$; $(\frac{\pi}{3}, \sqrt{3})$
   (d) $y = \frac{2}{x+1}$; (0,2)
   (e) $y = \tan^2 x$; $(\frac{\pi}{3}, \sqrt{3})$

(f) $y = x\sqrt{1+x^2}$; $(1,\sqrt{2})$

(g) $y = \sin(\sin x)$; $(\pi, 0)$

(h) $y = \tan(\frac{\pi x^2}{4})$; (1,1)

3. Find the derivative $\frac{dy}{dx}$, by implicit differentiation, for the given curve:

(a) $x^3 + x^2y + 4y^2 = 6$

(b) $x^2y + xy^2 = 3x$

(c) $\sqrt{xy} = 1 + x^2y$

(d) $4\cos x \sin y = 1$

(e) $\cos(x - y) = y \sin x$

4. Find the derivative $\frac{dy}{dx}$ for the given curve at the indicated point:

(a) $y^2 = x^3(2 - x)$; (1,1)

(b) $x^{\frac{2}{3}} + y^{\frac{2}{3}} = 4$; $(-3\sqrt{3},1)$

5. Find an equation for the tangent line to the given function at the indicated point:

(a) $\sqrt{x} + \sqrt{y} = 3$; (4,1)

(b) $y = \tan x$; $(\frac{\pi}{3}, \sqrt{3})$

(c) $y = x\sqrt{1+x^2}$; $(1,\sqrt{2})$

(d) $y = \sin(\sin x)$; $(\pi, 0)$

(e) $y = \tan(\frac{\pi x^2}{4})$; (1,1)

6. Find $\frac{d^2y}{dx^2}$, by implicit differentiation, at the indicated point:

(a) $x^3 + y^3 = 16$; (2,2)

(b) $xy + y^2 = 1$; (0,-1)

7. Find the absolute maximum and absolute minimum values of the given functions on the given interval.

(a) $f(x) = 3x^2 - 12x + 5$ and $[0, 3]$

(b) $f(x) = x^3 - 3x + 1$ and $[0, 3]$

(c) $f(x) = 2x^3 + 3x^2 + 4$ and $[-2, 1]$

(d) $f(x) = 18x + 15x^2 - 4x^3$ and $[-3, 4]$

(e) $f(x) = x^4 - 4x^2 + 2$ and $[-3, 2]$

(f) $f(x) = 3x^5 - 5x^3 - 1$ and $[-2, 2]$

(g) $f(x) = x + \cos x$ and $[0, 2\pi]$

(h) $f(x) = 2x - 3x^{\frac{2}{3}}$ on $[-1, 3]$.

8. Find all numbers c that satisfy the conclusion of Rolle's Theorem for the given functions on the given intervals.

(a) $f(x) = x^2 - 4x + 1$ and $[0, 4]$

(b) $f(x) = x^3 - 3x^2 + 2x + 5$ and $[0, 2]$

(c) $f(x) = 9x^2 - x^4$ and $[-3, 3]$

9. Find all numbers c that satisfy the conclusion of the Mean Value Theorem for the given functions on the given intervals.

   (a) $f(x) = 3x^2 + 2x + 5$ and $[-1, 1]$

   (b) $f(x) = x^3 + x - 1$ and $[0, 1]$

   (c) $f(x) = 3x^2 + 6x - 5$ and $[-2, 1]$

10. Find:

    (a) intervals of increase or decrease

    (b) relatively maximum or minimum values

    (c) intervals of concavity

    (d) points of inflection and

    (e) sketch the curve.

        i. $y = x^3 + x$

        ii. $y = x^3 - 3x$

        iii. $y = x^5 + 4x^3$

        iv. $y = x^5 - 5x^4$

        v. $y = 4x^3 - x^4$