**MAT141 Practice problems for Test # 2 FALL 2009 Prof. Alzugaray**

**Find $f'(x)$ :**

**1.** $f(x) = \dfrac{4x+1}{3x-2}$

**2.** $f(x) = 2^x - \tan x$

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

**4.** $f(x) = x^{3x}$

**5.** $f(x) = \ln(x^3-2)\sin x$

**6.** $f(x) = (4x^5 - x^2)^7$

**7.** $f(x) = \arcsin(x^2)$

**8.** $f(x) = \dfrac{x^{3/4}\sqrt{x^2+1}}{(3x+5)^2}$

**9.** The length of a triangle is increasing at a rate of 8 cm/s and its width is increasing at a rate of 3 cm/s. When the length is 20 cm and the width is 10 cm, how fast is the area of the rectangle increasing?

**10.** The following equation defines a function $y = y(x)$. Find $y'$:

$$e^y \cos x = 1 + \sin(xy)$$

**11.** Find an equation of the tangent line to the curve $x^2 + 2xy - y^2 + x = 2$ at the point (1,2).

**12.** Find $(f^{-1})'(e^2+8)$ if $f(x) = e^x + x^3$.

**13.** Find the intervals on which $f$ is increasing or decreasing. Find its extrema.

$$f(x) = 2x^3 - 3x^2 - 12x + 1.$$

**14.** Find the intervals of concavity and the inflection points of

$$f(x) = e^{-1/(x+1)}$$