MATH 215 WORKSHEET #9.25

(1) Compute the derivatives of the following:
   (a) \( f(x) = \sec(x^3 + 2) \)
   (b) \( g(x) = \sqrt{\sin x^2} \)
   (c) \( j(x) = \cos(\sin x) \)
   (d) \( k(x) = \cos x \sin x \)

(2) The spawner-recruit function for geckos is \( f(S) = 1.2S - .001S^2 \).
    Find the maximum sustainable harvest for your cat.

(3) The amount of pollen collected by a bee in \( t \) minutes at a flower
    is \( F(t) = \frac{t}{1+t} \). It takes an average of \( \tau = 5 \) minutes to fly from
    flower to flower. Find the amount of time \( t \) that maximizes the
    rate of collection \( R(t) = \frac{F(t)}{t+\tau} \).

(4) Find the local maxima, minima, and intervals where the function
    \( g(x) = x + \sin x \) is increasing and decreasing.

(5) Find the critical points of the function \( h(x) = 4x^3 - 2x \), determine
    if they are local minima or maxima. Also, determine the
    inflection points of the function (if any) and where the function
    is concave up and concave down.

(6) Find the critical points of the function \( f(x) = 4x^2 - x^4 \). De-
    termine which of the critical points are maxima and minima.