SI Session: Exam II Review
Tuesdays: 3:30 PM – 5:00 PM
Thursdays: 1:30 PM – 3:00 PM
& 3:30 PM – 5:00 PM
Room 1245 SNAD

Prof. Stockton : Calculus I
Spring 2009
SI Leader : Neil Jody

[1] Find the derivative of each function. Do not simplify.

(a) $f(x) = x^2 \sec x$

(b) $f(x) = \dfrac{2x}{x^2 + 5}$

(c) $f(x) = \dfrac{\sqrt{x^2 + 3}}{\sin(4x)}$

(d) $f(x) = \left(x^3 - 2x^2\right)^{15} \tan x$

(e) $f(x) = \sqrt[3]{\cos\left(x^2\right)}$

[2] Find the absolute extrema of the function $f(x)=\dfrac{2x}{x^2+1}$ on the interval $[0,2]$.

[3] Let $f(x)=\sqrt[3]{x}(x-8)$. Find each of the following:

(a) open interval(s) on which $f$ is increasing ______________________

(b) open interval(s) on which $f$ is decreasing ______________________

(c) relative minima ______________________

(d) relative maxima ______________________

[4] Let $f(x) = x^4 - 6x^3$. Find each of the following:

(a) open interval(s) on which $f$ is concave up ______________________

(b) open interval(s) on which $f$ is concave down ______________________

(c) inflection points of $f$ ______________________

[5] Use implicit differentiation to find $\frac{dy}{dx}$ if $xy = \cos(y^2)$.

[6] Find the slant asymptote of the function $f(x)=\dfrac{x^3-x^2+2x+3}{x^2+2}$.

[7] The area of a circle is increasing at the rate of 4 $\text{in}^2$/min. At what rate is the radius increasing when the area is 30 $\text{in}^2$?

[8] Fill in the blank: Let $f(x)=x^3+2x-3$. The *Mean Value Theorem* guarantees that there is at least one number *c* between -1 and 2 such that $f'(c)=$____________.

[9] Sketch the graph of a function $f$ satisfying the following conditions:

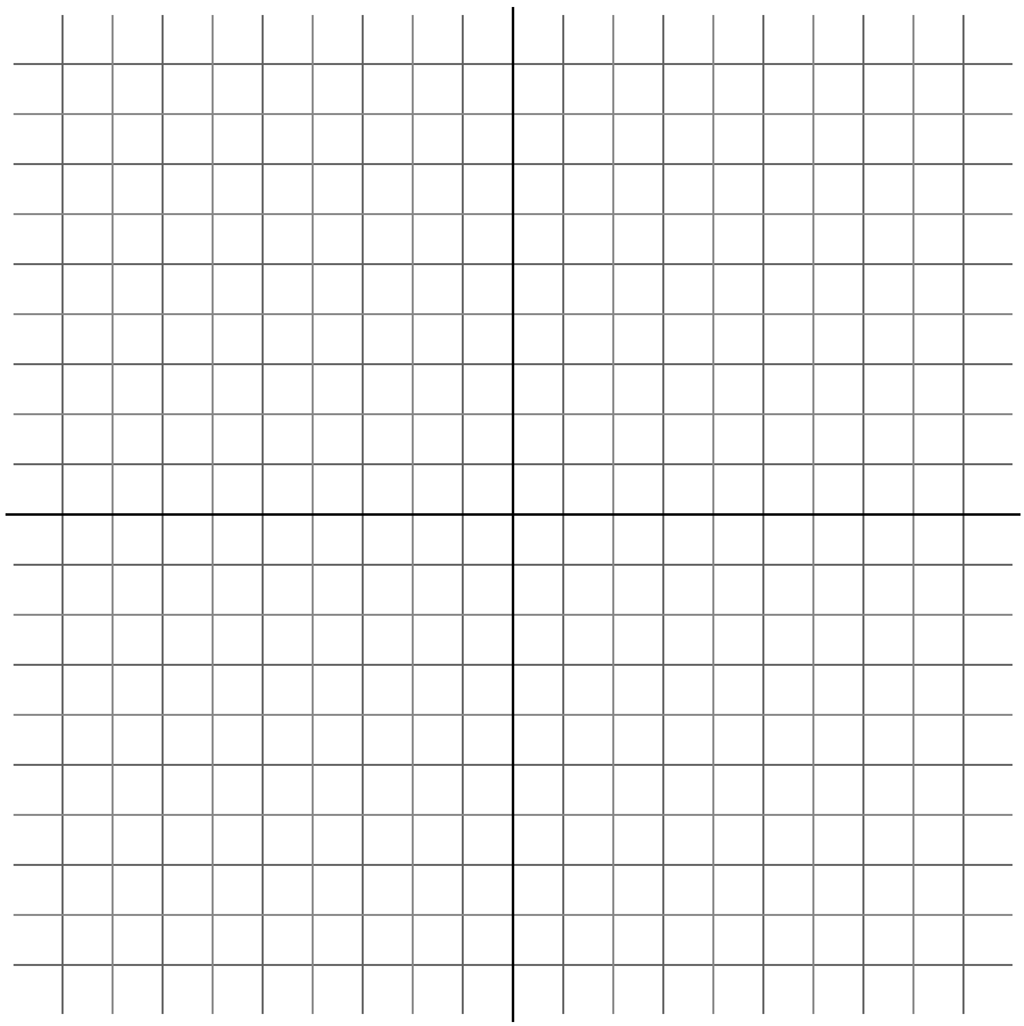
(i) $f(0)=3$, $f(1)=2$, $f(2)=1$, $f(4)=0$

(ii) the line $x=3$ is a vertical asymptote

(iii) $f$ is increasing on $(-\infty,0)$, $(2,3)$ and decreasing on $(0,2)$, $(3,+\infty)$

(iv) $f$ is concave up on $(1,3),(3,4)$ and concave down on $(-\infty,1),(4,+\infty)$

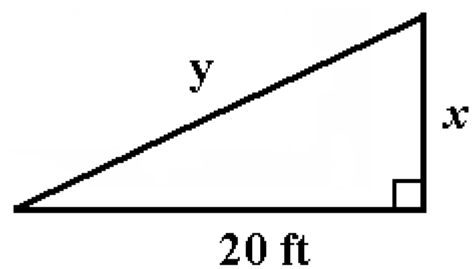
(v) the graph of $f$ is "smooth"



[10] Find an equation of the tangent line to the graph of $x^3y + y^2 - 3x = 9$ at the point $(-1,3)$.

[11] Consider the right triangle shown to the right:

If y is decreasing at the rate of 2 ft/sec, find the rate at which x is decreasing when y is 30 ft.



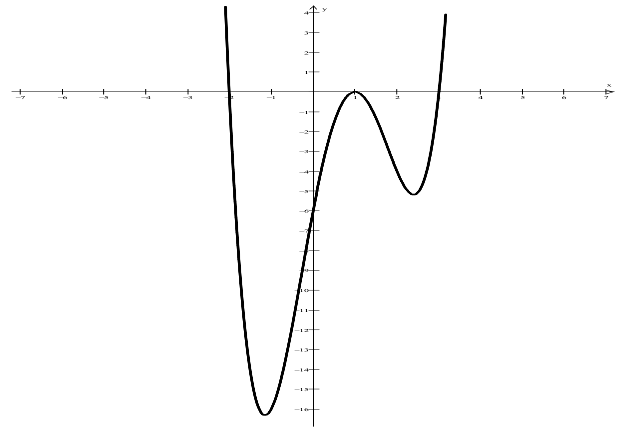
[12] The graph of the *derivative* of a function *f* is given below. Use the graph to determine each of the following:

a) intervals where *f* is increasing

b) intervals where *f* is decreasing

c) the relative maxima of *f*

d) the relative minima of *f*



[13] Given the graph of $y = f(x)$ below, determine the following:

a) intervals where $f' < 0$

b) intervals where $f' > 0$

c) the relative maxima of *f*

d) the relative minima of *f*

e) intervals where $f'' > 0$

f) intervals where $f'' < 0$

g) Inflection points

h) intervals where *f* is continuous

i) intervals where *f* is differentiable