SI Session: Exam II Review
Monday June 30th
12:30 PM – 2:30 PM
Room 1229

Prof. Stockton : Calculus I
Summer I 2008
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 $f(x) = \frac{2x}{x^2+1}$ 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 $xy = \cos\left(y^2\right)$.

[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 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:

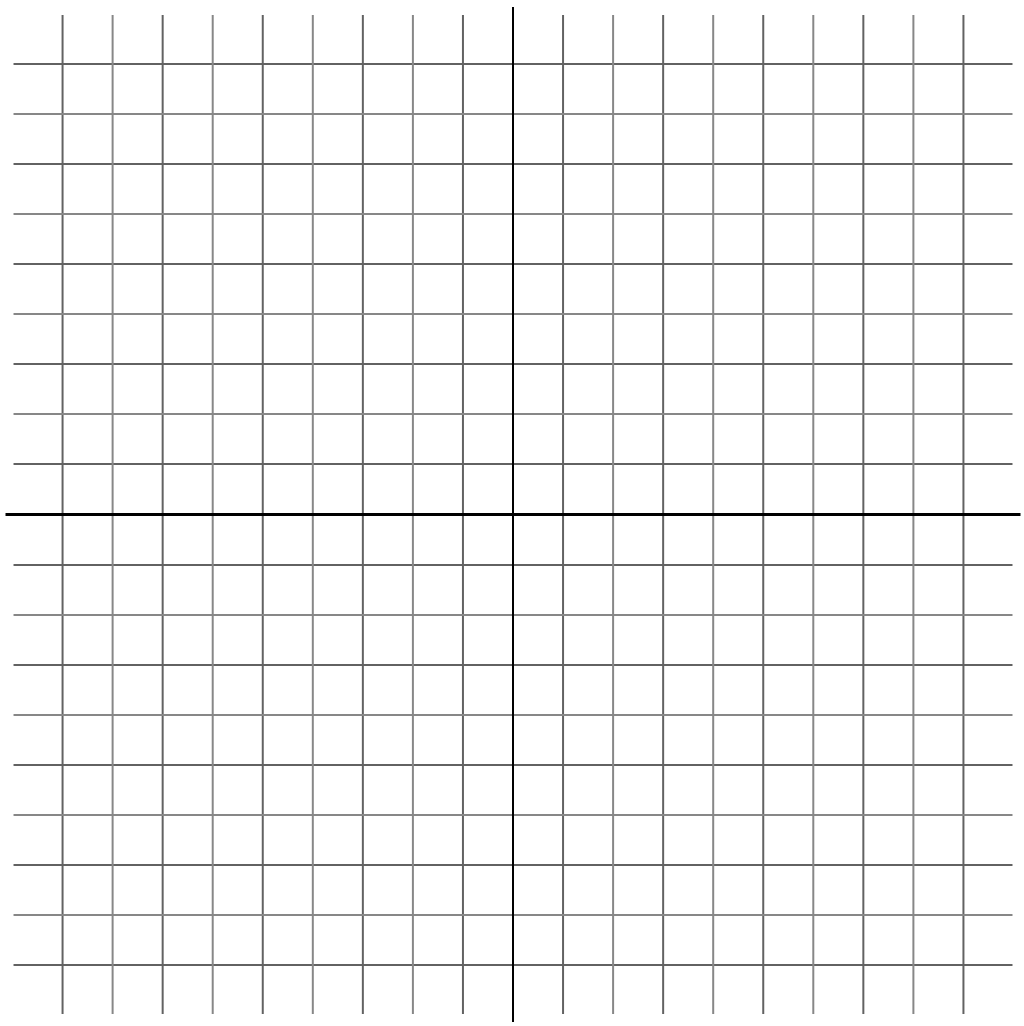
(i) $f(0)=3$, $f(1)=2$, $f(2)=1$, $f(4)=0$

(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 $x^3 y + y^2 - 3x = 9$ 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.