King Fahd University of Petroleum and Minerals | Serial #: ____ St. Number: _____

Department of Mathematics and Statistics | Name: _____

Instructor: M. Z. Abu-Sbeih | Math - 132.1 | Test No. 2 | Date: 11-4-2016.

6:30 - 8:00 PM

Note: Show all your work. No credits for answers not supported by work.

Question No.	Mark	Obtained Mark
Q1	35	
Q2	10	
Q3	10	
Q4	10	
Q5	35	
Total	**100**	

Problem 1: (35 points) Consider the function

$$y = f(x) = \frac{x^2}{1+x^2} \quad \text{with } f'(x) = \frac{2x}{(1+x^2)^2} \quad \text{and } f''(x) = \frac{2-6x^2}{(1+x^2)^3}$$

a. Find all vertical and horizontal asymptotes of the function $f(x)$, if any exists.

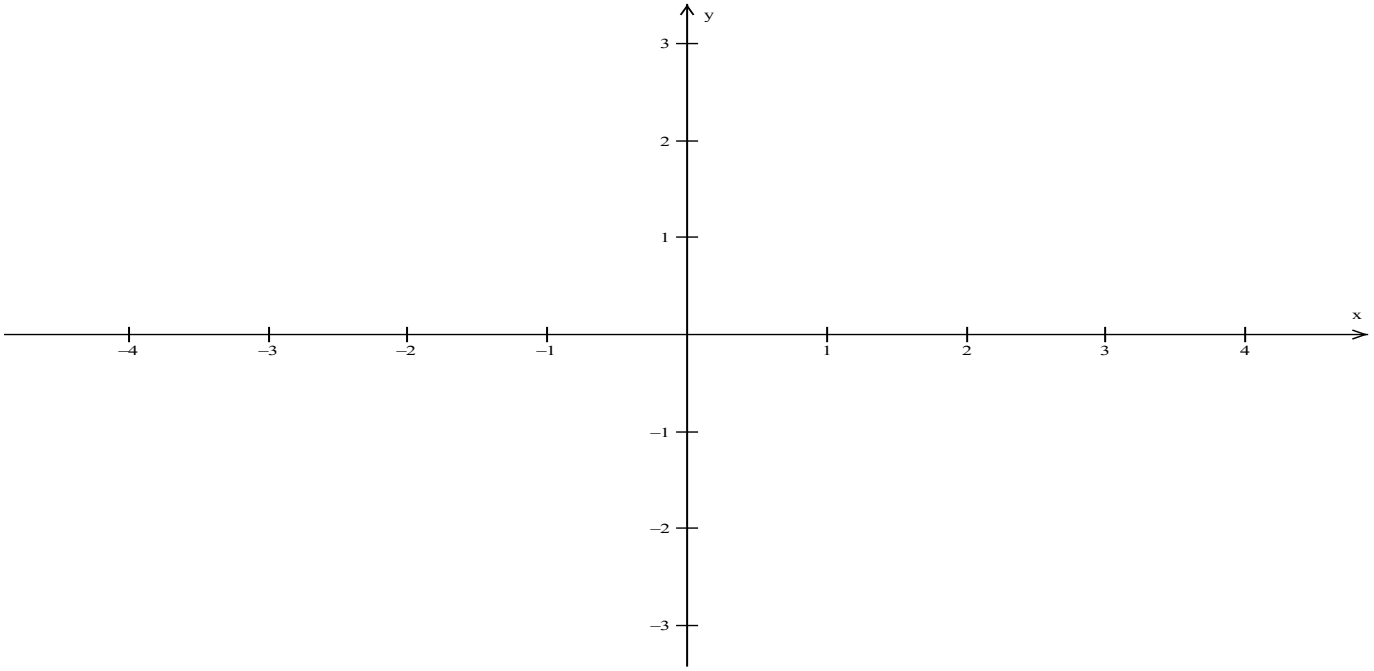
b. Find the critical numbers.

c. Find intervals where the function is increasing and those where it is decreasing.

d. Find the local maximum and minimum of the function if any exists.

e. Discuss the concavity of the function and find the infection points.

f. Sketch the graph of the function. Clearly indicate asymptotes, the critical numbers, extrema and inflection points on the graph.



Problem 2: (10 points) if $y = \frac{x}{1+\sqrt{x}}$; find dy when $x = 1$ and $dx = 0.1$

Problem 3: (10 points) A Bookstore seels 200 copies of a sciece book each month at a price of 20 SR. For each 2 Riyals increase in the price of the book, the sold copies will drop by 5 copies. Find the price of the book which will give **maximum revenue, and what is the maximum revenue?**.

Problem 4: (10 points) Find the area enclosed by the graphs of $y = x^3 - x$ and $y = x$.

Problem 5: (35 points) Evaluate:

(a) $\int_1^2 \frac{\ln \sqrt{x}}{x}\, dx$

(b) $\int (x+1)e^{x^2+2x}\,dx$

(c) $\int \frac{x^2+4x+4}{x+1}dx$

(d) $\int 3^x \sqrt{2^{4x}}\, dx$

(e) $D_x \left(\int_2^x \frac{1+\sqrt{t}}{\ln t}\, dt \right)$