1. The reaction of the body to a dose of medicine can something be represent by an equation of the form

y = x ^ 2 \* (c/2 - x/3)

(1)

where c is positive constant (c > 0) and z is the amount of medicine absorbed in the blood. if the reaction is a change in blood pressure, y is measured in millimeters of mercury. One need to understand the behavior of the sensitivity of the body to medicine (ie, the instantaneous rate of change of the reaction with respect to the amount of medicine absorbed in the blood).

(a) Describe the instantaneous rate of change of the body to the medicine (represent by S = d/dx (y) ) as a function of the amount of the medicine absorbed in the blood z.

(b) Plot the graph of the function S.

(c) Compute the critical values for S.

(d) Indicate the range for the amount of medicine absorb in the blood for which the sensitivity of the body S is increase/ decrease. [CLO 2, PLO 1] [10 marks]

2. a) Find the graph of a function y = F(x) which satisfies all the following properties:

i. F(x) has domain (- ∞, 0)

ii. F(x) has a vertical asymptotes at x = 0

iii. F(x) is increasing on the interval (- ∞, 0)

iv. F(x) is concave down on the interval (- ∞, 0) [CLO 1, PLO 1] [5 marks

b) Predict a formula for a function F(x) which satisfies all the properties listed in above parts. Justify your answer. [CLO 2, PLO 1] [5 marks]

3. For the function

ax + b, x>0

1-x+x^2 ,x<=0

Estimate all values of a and b for which the function will be continuous. b) Estimate all values of a and b for which the function will be differentiable. [CLO 2, PLO 1] [10 marks]