SHOW ALL WORK TO RECEIVE CREDIT. Circle your answers.

1. Locate the absolute extrema of the on the closed interval [–40,40].
2. Determine whether Rolle's Theorem can be applied to on the closed interval [2,3]. If Rolle's Theorem can be applied, find all numbers *c* in the open interval (2,3)such that .
3. For  on (0,2π), find the intervals where the function is increasing and decreasing as well as any relative extrema.

1. The function  describes the motion of a particle moving along a line.

a) Find the velocity function of the particle at any time *t*;

b) Identify the time intervals when the particle is moving in a positive direction;

c) Identify the time intervals when the particle is moving in a negative direction; and

d) Identify the times when the particle changes its direction.

1. Find the points of inflection and discuss the concavity of the function on the interval (0,2.
2. Sketch the graph of the function  using the concavity, extrema, intercepts, and asymptotes that you find.
3. Sketch the graph of the derivative of the following function:



1. A rectangular page is to contain 81square inches of print. The margins on each side are 1 inch. Find the dimensions of the page such that the least amount of paper is used.
2. A giraffe farmer plans to fence a rectangular pasture adjacent to a deep river. The pasture must contain 180,000 square meters in order to provide enough grass for the giraffe herd. What dimensions would require the least amount of fencing, provided no fencing is required along the river (Giraffes can’t swim).
3. Use differentials to approximate the value of .
4. The radius of a sphere is measured to be 9 inches, with a possible error of 0.02 inch. Use differentials to estimate the maximum possible error in calculating

a) the volume of the sphere

b) the surface area of the sphere