Advanced Placement Calculus

Name ______________________________

Copy original problem.

Per ________ Date ______________

Convince *me* that **you** understand the concept***!***

Chapter 11 Exam

I

Show that the tangent line to the curve $x^3 + xy^2 + x^3y^5 = 3$ at the point (1, 1) does or does not pass trhough the point (– 2, 3) ?

(10 pts)

II

Explain how "Newton's method" solves equations. Do not select any specific functions. Draw a picture of a generic function. Show graphically what "Newton's method" does. Derive the recursion identity.

Include a discussion of the significance of (1) when $f'(x) = 0$ and

(2) when $f''(x) = 0$ and $f'(x) \neq 0$ (20 pts)

III

Related rates. Draw a picture, identify required items, solve, answer using complete sentences.

a) A point P with coordinates (x, y) moves along the curve $y = \ln x$ so that its abscissa value (x–coordinate) increases at the rate of $\sqrt{3}$ inches per second. If P is one vertex of an equilateral triangle whose other two verticies are on the x–axis, find out how fast the area of the triangle is changing when the ordinate (y–coordinate) value is one. (25 pts)

b) A cube is contracting so that its surface area decreases at the constant rate of one-half square inch per minute. (25 pts tot)

1. Determine how fast the volume is changing when at 3 P.M. the surface area is fifty-four square inches.

2. Determine how fast the area of one of the faces is changing at the same time.

IV

Describe the similarities and differences between the Cartesian and the polar graphing planes. Include in your discussion directions for converting from one form to the other and back again. List, identify and label with the cartesian as well as the polar equations: one for a straight line through the pole with positive slope, one for a straight line through the pole with negative slope, one for a straight line with positive slope NOT through the pole; one for a straight line with negative slope NOT through the pole; one for a circle with center at the pole; one for a circle with center NOT at the pole; one for a circle with center located in what would be called the "second quadrant" if we were using cartesian rather than polar labeling. Briefly describe eccentricity including examples of the equations in polar form of an ellipse, a circle, a hyperbola, and a parabola. (20 pts)

Extra Credit ------------------------------------ 5 pts ....

Refering to *III* above: When (if at all) will the cube disappear?