

Advanced Placement Calculus

Name _____

Copy original problem.

Per _____

Date _____

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

Last Regular Exam

I Given a line described: $y = x + 1$ and a parabola described: $y = 2x^2$. (25 pts tot)

- Find the points of intersection of the line and the parabola.
- Determine the area trapped between the given line and the given parabola.
- For what values of k does the line $y = k(x + 1)$ have **no** intersection with the parabola?

II For the curve $y = f(x)$ it is given that $f'(x) = 4x - 2$ and the curve passes through the point $(1, 0)$. (10 pts ea)

- Obtain the equation of this curve and show that it also passes through the origin.
- Sketch the region bounded by this curve, its tangent at $(1, 0)$ and the axis $x = 0$.
- Find the equation of this tangent and calculate the area of the region.

III Let R be the region in the first quadrant enclosed by the hyperbola $x^2 - y^2 = 16$, the x -axis and the line $x = 6$. (15 pts ea)

- Sketch R . Set up the integral expression in terms of a single variable for the area of R . Using your grapher, evaluate your formula.
- Set up an integral expression in terms of x for the volume of the solid obtained when the region R is revolved about the x -axis. Using your grapher, evaluate your formula.
- Set up a definite integral in terms of a y for the volume of the solid generated when R is revolved about the line $x = -2$. Using your grapher, evaluate your formula.

Extra Credit ----- **5 pts** -----

A particle is initially at rest at the origin. The particle moves along the x axis with acceleration $a(t) = 70 + 12t - 12t^2$ where time t is positive. Find the particle's maximum displacement in the positive direction.