

These problems are to be done individually; no consultation with others is permitted. Write in the space provided. Exact answers are required unless otherwise stated. Show all necessary work in an orderly manner. Use other side if necessary. Place numerical answers in the appropriate blanks. All problems have equal weight. Write clearly and neatly. Explanations must correctly apply calculus ideas from class.

1. Sketch the region bounded by the given lines and write the area as a sum of **TWO** definite integrals. $y = 2x$, $y = 3x$, $y = x + 6$
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2. Find the intervals of values of t where x and y are increasing or decreasing. Find a formula for $m(t)$ and sketch the graph. $x = 3 \cos^2 t$, $y = 6 \sin^2 t$

x incr _____

x decr _____

y incr _____

y decr _____

$m(t)$ _____

In the remaining problems, sketch the region bounded by the given curves and write one definite integral which gives the volume of the solid obtained by revolving the region about the given axis. Do not evaluate the integrals

3. Bounded by $x = 1$, $y = x^2$, $y = x + 2$; about the y -axis

4. Bounded by $x = 1$, $y = x^2$, $y = x + 2$; about the x -axis

5. Bounded by $x = 2$, $x = 4$, $y = x$, $y = e^x$; about the line $x = 1$

6. Bounded by $y = 2$, $x = 0$, $y = 0$, $x = \sqrt{y^2 + 4}$; about the x -axis
