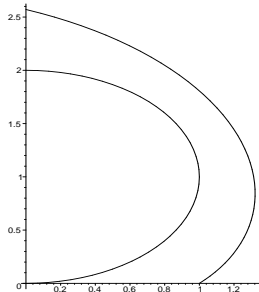


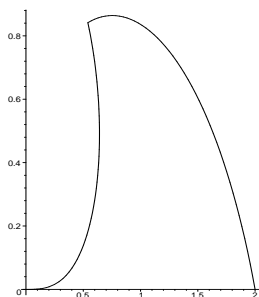
Name _____ Section _____

1. Determine the area between the curves $r(t) = 1 + t$ and $r(t) = 2 \sin t$ in the first quadrant.



2. Determine the unit tangent vector to $r(t) = 2 \sin t$ at $t = \frac{\pi}{6}$ and add it to the picture above.

3. Determine the area between the polar curves $r(t) = \sqrt{t}$ and $r(t) = 2 - t$ in the first quadrant.



4. Set up the integral to determine the arclength of the curve given by $\vec{r}(t) = \langle t \cos t, t \sin t \rangle$.

5. Set up the integral to determine the arclength of the curve given by $r(\theta) = 1 - 2 \sin \theta$.
6. Set up the integral to determine the arclength of the curve given by $f(x) = x^2 - x$ on $0 \leq x \leq 1$.
7. Determine the work done to raise a 3 ft^3 bucket of water from a 60 ft well with a rope weighing 1 lb/ft if 0.25 lbs of water is lost per foot lifted. Water weighs approximately 62.5 lb/ft^3 .
8. Determine the work W done to pump the water over the top of a filled semi-spherical bowl with radius 4 feet. (Hint: draw a work element, the equation of the semi-circle is $x^2 + y^2 = 16$ and the distance is $-y$)