Name: _____

1. Set up, **but do not evaluate**, an integral for the length of the curve given by $y = \dfrac{x^4}{16} + \dfrac{1}{2x^2}$, $1 \leq x \leq 2$.

10 pts

2. Find parametric equations for the path of a particle that moves along the circle $(x-1)^2+y^2 = 9$ once clockwise, starting at $(1, 3)$. Remember to include an **interval for the parameter**. Support your work with a **sketch**.

6 pts

(OVER)

3. Consider the surface obtained by rotating the curve given by $9x = y^2 + 18$, about the x-axis, $2 \leq x \leq 4$.

16 pts

(a) Set up, **but do not evaluate**, an integral with respect to x for the area of the surface.

(b) Set up, **but do not evaluate**, an integral with respect to y for the area of the surface.

4. Sketch the region in the plane consisting of points whose polar coordinates satisfy the given conditions: $2 < r \leq 5$, $5\pi/3 \leq \theta < 7\pi/3$.

10 pts

5. Consider the curve given by $x = \tan\theta$, $y = \sec\theta$. Find the equation of the tangent to the curve at the point $(1, \sqrt{2})$.

16 pts

6. Set up, **but do not evaluate**, an integral for the area of the surface obtained by rotating the curve $x = e^t - t$, $y = 4e^{t/2}$ about the y-axis, $0 \leq t \leq 1$.

10 pts

7. Find a polar equation for the curve represented by the Cartesian equation $x + y = 2$.

6 pts

8. Find a Cartesian equation for the curve represented by the polar equation $r = \csc\theta$. **Show your work algebraically.**

6 pts

9. Set up, **but do not evaluate**, an integral for the length of the polar curve $r = 3\sin\theta$, $0 \leq \theta \leq \pi/3$.

10 pts

10. Set up, **but do not evaluate**, an integral expression for the area of the region that lies inside both curves $r = \sin 2\theta$ and $r = \sin\theta$. **Draw** a sketch to support your work, and **show** how you determined the endpoints of integration.

10 pts