MATH 8 **Parametric and Polar Sample Exercises**

1. **Setup but don't evaluate** the integral evaluating the surface area obtained by rotating the given curve about the given axis

c. $\{y = x^2 - 1,\ 0 \le x \le 1\}$ about $x = 1$ **d.** $\{y = x^2 - 1,\ 0 \le x \le 1\}$ about $y = 3$

For problems 1-5:

a. Change each of the following parametric equations to Cartesian equation.

b. Graph the curve represented by each of the parametric equations. (show orientation)

c. Evaluate $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$.

2. $x = \tan t,\quad y = \sec t$ **3.** $x = 2\sin t,\quad y = 3\cos t$

4. $x = -3\cos^2 t,\ y = 2\sin t$ **5.** $x = 2\sinh(t),\ y = -3\cosh(t)$

6. Evaluate the surface area generated by revolving $x = \tan t,\ y = \sec t;\ 0 \le t \le \frac{\pi}{4}$ about the line $x = -1$.

7. Prove the surface area formula for a sphere.

For Problems 8-11, **a.** Sketch the graph of each of the following polar equations. **b.** Evaluate $\frac{dy}{dx}$

8. $r = 3\sin(2\theta)$ **9.** $r = 2\cos(3\theta)$ **10.** $r = 5\sec\theta$

11. $r = 2 + 3\sin\theta$

13. **Setup but don't evaluate** the area inside both $r = 4\sin(3\theta)$ and $r = 4\cos(3\theta)$.

14. **Setup but don't evaluate** the area inside $r = 4\sin(3\theta)$ and outside of $r = 4\cos(3\theta)$.

14. **Setup but don't evaluate** the area inside $r = 4\cos(3\theta)$ and outside of $r = 4\sin(3\theta)$.

12. **Setup but don't evaluate** the integral evaluating the surface area generated by revolving $r = 3\sin(2\theta);\ 0 \le \theta \le \frac{\pi}{4}$ about the line $\theta = \frac{\pi}{2}$.