1. Find an equation of the sphere that passes through the origin and whose center is $(1, -2, 2)$.

2. *True / False?* Suppose f and g are functions of t, then the following two parametric curves has the same tangent line at $t = 0$:

$$x = f(t), \quad y = g(t);$$

and
$$x = f(-2t), \quad y = g(-2t).$$

3. *True / False?* Given a polar curve $r = f(\theta)$, the area under the curve and above the x-axis from $\theta = \alpha$ to $\theta = \beta$ is always given by

$$\int_\alpha^\beta \frac{1}{2} f(\theta)^2 \, d\theta.$$