MTH 265, Quiz #12, Summer 2024 Name \_\_\_\_\_

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Consider the function  $x = \sqrt{y^2 + z^2}$ . Identify the surface. Convert the surface to parametric surface form  $\vec{r}(u, v)$ . Find the equation of the tangent plane at (5,3,4).

2. Find the arc length of the function  $\vec{r}(t) = t^2 \hat{i} + \ln t \hat{j} + t \ln t \hat{k}$  on the interval [1, *e*]. After setting up the integral, you may evaluate it numerically (in a calculator).

3. Find the curvature of the function  $\vec{r}(t) = t^2 \hat{i} + \ln t \hat{j} + t \ln t \hat{k}$  at the point  $(e^2, 1, e)$ . Then use that to find the radius of curvature.

4. Find the surface area of the function z = xy over the region bounded inside the cylinder  $x^2 + y^2 = 2$ .

5. Set up the integral needed to find the surface area of the function  $\vec{r}(u, v) = u^2 \cos v \hat{\iota} + u^2 \sin v \hat{\jmath} + uv \hat{k}$  over the region  $0 \le u \le 3, 0 \le v \le 2\pi$ . You do not need to integrate.