

Your Name

Student ID #

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Your TA's name

Your Quiz Section Label and Time

Problem	Possible	Points
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- No books allowed. You may use a scientific calculator and one $8\frac{1}{2} \times 11$ sheet of **handwritten** notes.
- Even if you have a calculator, give me **exact answers**.
- Do not share notes.
- In order to receive credit, you must show your work and explain your reasoning.
- Place a box around **YOUR FINAL ANSWER** to each question.
- If you need more room, use the backs of the pages and indicate to the grader where to find your work.
- Raise your hand if you have a question or need more paper.

Don't open the test until everyone has a copy and the start of the test is announced.

1 (10 points) Consider the curve given by the equation in polar coordinates

$$r = 1 + \sin \theta.$$

Find the equation of the tangent line to the curve at $\theta = \pi/6$.

2 (10 points total) Three points are given: $P(0, -1, 1)$, $Q(1, 2, 2)$, and $R(3, 1, 0)$.

(a) (5 points) Find the area of the triangle PQR .

(b) (5 points) Find the cosine of the angle of the triangle PQR at the vertex Q .

3 (10 points) Find an equation of the plane which contains the line

$$\frac{x-1}{2} = \frac{y+2}{-3} = \frac{z-3}{4}$$

and is perpendicular to the plane $x + y - z = 0$.

4 (10 points) Let S be the surface defined as the set of points $P(x, y, z)$ such that the distance from P to the plane $x = 2$ equals the distance from P to the line $x = 1, z = 3$. Find an equation for S . Simplify the equation and determine what kind of surface this is.

5 (10 points total)

(a) (2 points) Identify the surface given by the equation $3x^2 = y^2 + z^2$ (sketch is not required).

(b) (8 points) Find a vector function $\vec{r}(t)$ that represents the curve of the intersection of the surfaces $3x^2 = y^2 + z^2$ and $y + 2x = 1$.