

Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has four (4) pages, including this one.
- You have fifty (50) minutes to complete the test.
- Enter your answer in the box(es) provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

Page	Max. points	Your points
2	55	
3	25	
4	20	
Total	100	

Problem 1 (10 pts). Find the distance d from the point $(3, 7, -5)$ to the z -axis.

$d =$

Problem 2 (15 pts). Find an exact expression for the angle θ between the vectors $\mathbf{v} = \langle 3, -1, 5 \rangle$ and $\mathbf{w} = \langle -2, 4, 3 \rangle$.

$$\theta =$$

Problem 3 (15 pts). Find a unit vector \mathbf{v} that is orthogonal to both $\mathbf{i} + \mathbf{j}$ and $\mathbf{i} + \mathbf{k}$.

$$\mathbf{v} =$$

Problem 4 (15 pts). Determine whether the points $A = (0, -5, 5)$, $B = (1, -2, 4)$ and $C = (3, 4, 2)$ lie on a straight line.

Problem 5 (10 pts). Find the equation of a sphere that goes through the origin, and whose center is the point $P = (1, 3, 2)$.

sphere:

Problem 6 (15 pts). Consider the point $P = (0, 1, 1)$ and the line ℓ with parametric equations

$$\begin{cases} x = 3 + t \\ y = 2t \\ z = 1 - t \end{cases}$$

(a) Find the equation of a plane that goes through P and is perpendicular to ℓ .

plane:

(b) Compute the intersection of the line ℓ with that plane.

point:

(c) Compute the distance d from P to ℓ .

 $d =$

Problem 7 (20 pts). Find parametric equations for the line of intersection of the planes $x+y+z = 1$ and $x + 2y + 2z = 1$. Find the angle θ between the two planes.

 $\theta =$

line: