To receive credit for your answers you must show all your work, explain your reasoning carefully and clearly, and include all steps necessary to completely justify each answer. Any variables you use must be clearly identified. Box in your answers when it is possible. Good luck!

Problem 1. You are at the point \((-1, 2, 3)\) facing the \(xz\)-plane. You walk 3 units forward, turn left and walk for another 3 units. What is your final position?

Problem 2. Suppose \(a\) and \(b\) are vectors that lie in the plane \(3x + 2y - 5z = 1\). Compute \((2a + 3b) \cdot (3, 2, -5)\)

Problem 3. Describe the surface whose equation in cylindrical coordinates is \(z = 4r\).

Problem 4. Describe (in words) and find the equation of the intersection of the surface \(x = y^2 + z^2\) and the plane \(x = y\).

Problem 5. Find the area of quadrilateral \(ABCD\) where \(A(2, 5, 0), B(1, 1, 0), C(8, 7, 0)\) and \(D(6, 2, 0)\). Note that \(ABCD\) is not a parallelogram (Draw a picture in the \(xy\)-plane).

Problem 6. Consider the two planes \(2x - 3y + 5z = 2\) and \(4x + y - 3z = 7\).

1. Find the angle between the two planes.
2. Find the equation of the plane perpendicular to these two planes and that passes through the point \((4, 5, 6)\).

Problem 7. A bird is flying with the velocity \(\vec{v} = 10i + 2j\) relative to the air (the speed is measured in m/sec, \(i\) represents the unit vector heading West and \(j\) is the unit vector heading North). The wind is blowing from the west at the speed of 5 m/sec.

1. Draw a picture showing the vectors:
   - \(\vec{v}\) = the velocity of the bird relative to the air
   - \(\vec{W}\) = the velocity of the wind.
   - \(\vec{u}\) = the velocity of the bird relative to the ground.
2. Find the components of the vectors \(\vec{w}\) and \(\vec{u}\).
3. Find the speed of the bird relative to the ground.

Problem 8. Consider the two lines: \(L_1 : x = -t, y = t, z = 2t\) and \(L_2 : x = 3 + s, y = 3s, z = 5 - 4s\).

1. Show that these two lines are not parallel.
2. Show that these two lines do not intersect.
3. Find then the distance between these (skew) lines \(L_1\) and \(L_2\).