

Math 2313, Test I

Name _____

1. Find the equation of the plane perpendicular to the line $x = 1 - 3t, y = -2 + 4t, z = -1 + 2t$. and through the point $(1, 3, -3)$.
answer: $-3x + 4y + 2z = 3$

2. Find the volume of the parallelepiped with edges $\langle 2, 0, 4 \rangle, \langle 0, 1, 2 \rangle$ and $\langle -1, 2, 0 \rangle$.
answer: 4

3. Find the angle between the planes $2x + 2y - 2z = 3$ and $-x - 2y - z = 5$.
answer: angle between $\langle 2, 2, -2 \rangle$ and $\langle -1, -2, -1 \rangle$ is 118.1° .

4. If $r(t) = \langle \sin(\pi e^t), e^t, \cos(\pi e^t) \rangle$, find the velocity vector $r'(t)$ and the speed, $\|r'(t)\|$.
answer: $r'(t) = e^t \langle \pi \cos(\pi e^t), 1, -\pi \sin(\pi e^t) \rangle, \|r'(t)\| = e^t \sqrt{\pi^2 + 1}$

5. Find the length of the helix of problem 4, from $t = 0$ to $t = 1$.
answer: $\int_0^1 \|r'(t)\| dt = \sqrt{\pi^2 + 1}(e - 1)$
6. Find parametric equations for the tangent line to the helix of problem 4, at the point $(0, 1, -1)$.
answer: $x = -\pi t, y = 1 + t, z = -1$
7. Determine the maximum height of a projectile fired from ground level ($y=0$), with an initial velocity of 128 feet per second at an angle of 30 degrees with the horizontal. (Hint: $\langle x'', y'' \rangle = \langle 0, -32 \rangle$)
answer: 64 feet