Michigan State University
Math 234 – Spring 2024

Some review problems - Exam 01
2024-01-31

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1. Find the length of $r(t) = (t^2, t^3, t^4)$, $0 \leqslant t \leqslant 2$.
2. Find the angle between $x + 4y - 3z = 1$ and $-3x + 6y + 7z = 0$.
3. Start at $(0, 0, 3)$, move 5 units along $x = 3\sin t$, $y = 4t$, $z = 3\cos t$ in the positive direction. Where are you now?
4. Find the are of the triangle with vertices $P(1, 4, 6)$, $Q(-2, 5, -1)$ and $R(1, -1, 1)$.
5. Find the distance from the point to the given plane

$$(1, -2, 4), \qquad 3x + 2y + 6z = 5.$$

6. Find the distance from the point to the given line

$$(4, 1, -2), \qquad (1 + t, 3 - 2t, 4 - 3t).$$

7. Parametrize the intersection of the two surfaces $z = x^2 + y^2$ and $2x - 4y - z - 1 = 0$.
8. Find the parametric equation of the line go through $(0, 1, 2)$, parallel to $x + y + z = 2$ and is perpendicular to $x = 1 + t, y = 1 - t, z = 2t$.
9. Let $\mathbf{a} = (1, 1, -2)$, $\mathbf{b} = (3, -2, 1)$ and $\mathbf{c} = (0, 1, -5)$. Find

$$\text{proj}_{\mathbf{a}}(\mathbf{b}) \qquad \text{and} \qquad \text{comp}_{\mathbf{a}}(\mathbf{b}).$$

10. Describe the surface $\phi = \frac{\pi}{3}$.
11. Write $x^2 - 2x + y^2 + z^2 = 0$ in cylindrical coordinate and spherical coordinate.