MATH 2130 Sample Test **60 minutes**

Student Name - **Student Number -**

Values

9 **1.** Find the equation of the plane that contains the lines

$$\frac{x-2}{2} = \frac{y+4}{3} = \frac{2-z}{5} \qquad \text{and} \qquad \begin{aligned} x &= 3+4t, \\ y &= -4+6t, \\ z &= 5-10t. \end{aligned}$$

Simplify your answer as much as possible.

Answer: $9x - 11y - 3z = 56$

9 **2.** Find the distance between the line $x - z = 3$, $x + 2y + 4z = 6$ and the plane $3x + 2y + 2z = 5$.

Answer: $7/\sqrt{17}$

5 **3.** Find parametric equations for the curve

$$x^2 + 2z^2 = 4, \qquad x + y + 2z = 10$$

directed clockwise as viewed from a point far out the positive y-axis.

Answer: $x = 2\cos t$, $y = 10 - 2\cos t - 2\sqrt{2}\sin t$, $z = \sqrt{2}\sin t$, $0 \le t \le 2\pi$

8 **4.** Find a unit tangent vector to the curve

$$x = t^2 + 1, \quad y = \frac{t-4}{t} \quad z = 3 - 2t^2$$

at the point $(17, 2, -29)$.

Answer: $\dfrac{1}{\sqrt{64 + 1/16 + 256}} \left(-8\hat{\mathbf{i}} + \dfrac{1}{4}\hat{\mathbf{j}} + 16\hat{\mathbf{k}} \right)$

5 **5.** Find equations for the projection of the curve

$$x + 2z = 1, \qquad x^2 + y^2 + z = 4$$

in the yz-plane. Is the projection a straight line, a parabola, a circle, an ellipse, a hyperbola, or none of these?

Answer: $4z^2 - 3z + y^2 = 3$, $x = 0$ Ellipse

4 **6.** If $\mathbf{v}(t) = t^2\hat{\mathbf{i}} + \dfrac{1}{2t-1}\hat{\mathbf{j}} + e^{4t}\hat{\mathbf{k}}$, evaluate

$$\int \mathbf{v}(t)\, dt.$$

Answer: $\dfrac{t^3}{3}\hat{\mathbf{i}} + \dfrac{1}{2}\ln|2t-1|\hat{\mathbf{j}} + \dfrac{1}{4}e^{4t}\hat{\mathbf{k}} + \mathbf{C}$