

Math 233 - Quiz 3

September 3, 2026

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (4 points) Find the area of triangle
- ABC
- .

$$A(1, 4, -2), \quad B(2, 2, 5), \quad C(-3, 1, 4)$$

$$\vec{AB} = \hat{i} - 2\hat{j} + 7\hat{k}$$

$$\vec{AC} = -4\hat{i} - 3\hat{j} + 6\hat{k}$$

$$\vec{AB} \times \vec{AC} = 9\hat{i} - 34\hat{j} - 11\hat{k}$$

$$\vec{AB} \times \vec{AC} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -2 & 7 \\ -4 & -3 & 6 \end{vmatrix} = \hat{i}(-12+21) - \hat{j}(6+28) + \hat{k}(-3-8)$$

$$\begin{aligned} \text{Area} &= \frac{1}{2} \|\vec{AB} \times \vec{AC}\| \\ &= \frac{\sqrt{81+1156+121}}{2} \\ &= \frac{\sqrt{1358}}{2} \approx 18.4 \end{aligned}$$

2. (3 points) Find parametric and symmetric equations for the line through
- $P(7, -2, 4)$
- and
- $Q(9, 3, 6)$
- .

$$\vec{PQ} = 2\hat{i} + 5\hat{j} + 2\hat{k}$$

Using $\vec{PQ}$ & P ...

PARAMETRIC

$$x = 2t + 7$$

$$y = 5t - 2$$

$$z = 2t + 4$$

SYMMETRIC

$$\frac{x-7}{2} = \frac{y+2}{5} = \frac{z-4}{2}$$

3. (3 points) Determine the angle between the two planes given below. Write your answer in degrees rounded to the nearest tenth.

$$P_1: 3x - 7y + z = 10$$

$$\vec{n}_1 = 3\hat{i} - 7\hat{j} + \hat{k}$$

$$P_2: 2x + 3y - 6z = 0$$

$$\vec{n}_2 = 2\hat{i} + 3\hat{j} - 6\hat{k}$$

$$\cos \theta = \frac{|\vec{n}_1 \cdot \vec{n}_2|}{\|\vec{n}_1\| \|\vec{n}_2\|} = \frac{|6 - 21 - 6|}{\sqrt{59} \sqrt{49}} = \frac{21}{7\sqrt{59}} = \frac{3}{\sqrt{59}}$$

$$\theta = \cos^{-1}\left(\frac{3}{\sqrt{59}}\right) \approx 67.0^\circ$$