

## Quiz 3

MATH 210, CALCULUS III, SUMMER 2015

NAME:

**Problem 1.** Find the area of a triangle with vertices  $O(0, 0, 0)$ ,  $P(0, 1, 3)$ , and  $Q(2, 3, 4)$ .

$$\begin{aligned}\vec{OP} &= \langle 0, 1, 3 \rangle & \vec{OQ} &= \langle 2, 3, 4 \rangle \\ \frac{1}{2} |\vec{OP} \times \vec{OQ}| &= \frac{1}{2} \left| \begin{vmatrix} i & j & k \\ 0 & 1 & 3 \\ 2 & 3 & 4 \end{vmatrix} \right| = \frac{1}{2} |i(1 \cdot 3 - 3 \cdot 3) - j(0 \cdot 4 - 2 \cdot 3) + k(0 \cdot 3 - 1 \cdot 2)| \\ &= \frac{1}{2} |-5i + 6j - 2k| = \frac{1}{2} \sqrt{(-5)^2 + (6)^2 + (-2)^2} \\ &= \frac{1}{2} \sqrt{25 + 36 + 4} = \frac{1}{2} \sqrt{65}\end{aligned}$$

**Problem 2.** Find an equation of the line passing through the point  $P_0(1, 2, -3)$  in the direction of  $\mathbf{v} = \langle 2, -3, 5 \rangle$ .

$$\begin{aligned}\mathbf{r}(t) &= \langle 1, 2, -3 \rangle + t \langle 2, -3, 5 \rangle \\ &= \langle 1+2t, 2-3t, -3+5t \rangle\end{aligned}$$

OR

$$\begin{aligned}x(t) &= 1 + 2t \\ y(t) &= 2 - 3t \\ z(t) &= -3 + 5t\end{aligned}$$