Q3

3 Points

$P(2, 0, -1)$ $Q(-1, 3, 4)$ $R(3, -1, 2)$

a) $\overrightarrow{RQ} = Q - R = (-1-3, 3-(-1), 4-2)$

$\overrightarrow{RQ} = (-4, 4, 2)$

$\overrightarrow{RQ} = \langle -4, 4, 2 \rangle$

$\overrightarrow{PR} = R - P = (3-2, -1-0, 2-(-1))$

$(1, -1, 3)$

$\overrightarrow{PR} = \langle 1, -1, 3 \rangle$

b) $A = \frac{1}{2} \| v \times w \|$

$\overrightarrow{PQ} = Q - P = (-1-2, 3-0, 4-(-1)) = \langle -3, 3, 5 \rangle$

$\overrightarrow{PR} = \langle 1, -1, 3 \rangle$

$$= \begin{bmatrix} i & j & k \\ -3 & 3 & 5 \\ 1 & -1 & 3 \end{bmatrix} = i \begin{vmatrix} 3 & 5 \\ -1 & 3 \end{vmatrix} - j \begin{vmatrix} -3 & 5 \\ 1 & 3 \end{vmatrix} + k \begin{vmatrix} -3 & 3 \\ 1 & -1 \end{vmatrix}$$

$9+5$ $\quad -9-5$ $\quad 3-3$

$= 14i - -14j + 0k$

$\overrightarrow{PQ} \times \overrightarrow{PR} = \langle 14, 14, 0 \rangle$

$|PQ \times PR| = \sqrt{14^2 + 14^2 + 0^2}$

$A = 19.799$

c) $r = P + t\overrightarrow{PR} = (2, 0, -1) + t\langle 1, -1, 3 \rangle$

$x\ y\ z = x_0 + ta,\ y_0 + tb,\ z_0 + tc$

$= 2 + 1,\ 0 - 1,\ -1 + 3$

~~$x, y, z = (2+t, 0-t, -1+3t)$~~

$x = 2 + t$

$y = 0 - t$

$z = -1 + 3t$