Answers ③

⑥ $n = \langle 3, 0, 4 \rangle$
$v = \langle 4, -1, -3 \rangle$
$n \cdot v = 12 + 0 - 12$ (dot product indicates $\perp$)

$p = (3, 2, 0)$

$3(x-3) + 2(y-0) + 0(z-4) = 0$
$3x - 9 + 2y = 0$
$\boxed{3x + 2y = 9}$

⑦ (A) xy-plane
The distance from the given point to the xy-plane is the absolute value of the z-coordinate.
A cont'd - $|-5| = \boxed{5}$

(B) The point closest to the y-axis from $(3, 7, -5)$ is $(0, 7, 0)$

$d = \sqrt{(3-0)^2 + (7-7)^2 + (-5-0)^2} = \sqrt{34} \approx \boxed{5.83}$

⑧ $a = \overrightarrow{PQ} = (-4, 3, 5)$ $b = \overrightarrow{PR} = (2, 3, -2)$ $c = \overrightarrow{PS} = (-1, 4, 1)$

$$a \cdot (b \times c) = \begin{vmatrix} -4 & 3 & 5 \\ 2 & 3 & -2 \\ -1 & 4 & 1 \end{vmatrix} = -4 \begin{vmatrix} 3 & -2 \\ 4 & 1 \end{vmatrix} - 3 \begin{vmatrix} 2 & -2 \\ -1 & 1 \end{vmatrix} + 5 \begin{vmatrix} 2 & 3 \\ 1 & 4 \end{vmatrix}$$

$= -44 + 0 + 55 = 11$

Volume of parallelpiped = $\boxed{11 \text{ units}^3}$