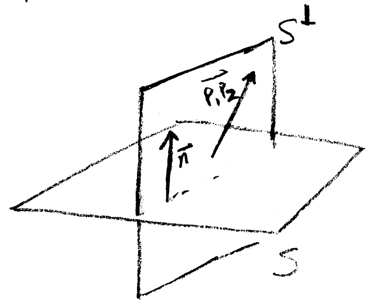
29. S: $8x - 2y + 6z = 1$
(1pt) $P_1(-1,2,5)$ $P_2(2,1,4)$. P_1 and P_2 lie in $S^{\perp}$.

The plane perpendicular to S must contain $\overrightarrow{P_1P_2}$ and $\vec{n} = (8,-2,6)$



So the cross product of $\vec{n}$ and $\overrightarrow{P_1P_2}$ form a nomal vector for $S^{\perp}$:

$$\vec{n} \times \overrightarrow{P_1P_2} = (8,-2,6) \times (3,-1,-1)$$
$$= (8, 26, -2) \equiv \overrightarrow{n^{\perp}}$$

Since P_1 is in $S^{\perp}$, we have:

$$\overrightarrow{n^{\perp}} \cdot (x+1, y-2, z-5) = 0 \Rightarrow 8(x+1) + 26(y-2) - 2(z-5) = 0$$
$$8x + 26y - 2z - 34 = 0$$
$$\boxed{4x + 13y - z - 17 = 0}$$

33. If the plane is equidistant betwen $P_1(-1,-4,-2)$ and $P_2(0,-2,2)$, it
(1pt) must pass through the midpoint of P_1 and P_2, and be perpendicular to the vector between P_1 and P_2. So:

$$\vec{n} = (1,2,4) \qquad P_0 = \frac{P_1 + P_2}{2} = \left(-\tfrac{1}{2}, -3, 0\right)$$

$$\Rightarrow \vec{n} \cdot \left(x + \tfrac{1}{2}, y+3, z\right) = 0 \Rightarrow \left(x+\tfrac{1}{2}\right) + 2(y+3) + 4z = 0$$
$$\Rightarrow \boxed{x + 2y + 4z + \frac{13}{2} = 0}$$

39. Simply apply Theorem 3.5.2: $D = \dfrac{|ax_0 + by_0 + cz_0 + d|}{\sqrt{a^2 + b^2 + c^2}}$
(1pt)

(a) Point: $(3,1,-2)$
Plane: $x + 2y - 2z = 4$

$\left.\begin{matrix} x_0 = 3 & y_0 = 1 & z_0 = -2 \\ a = 1 & b = 2 & c = -2 \end{matrix}\right\} \Rightarrow \boxed{D = \frac{5}{3}}$

(b) Point: $(-1,2,1)$
Plane: $2x + 3y - 4z = 1$ $\Big\} \Rightarrow \boxed{D = \frac{1}{\sqrt{29}}}$

(c) Point: $(0,3,-2)$
Plane: $x - y - z = 3$ $\Big\} \Rightarrow \boxed{D = \frac{4}{\sqrt{3}}}$