2pts

1a $5\langle-3,6,2\rangle - 3\langle5,4,7\rangle$

$\langle-15,30,10\rangle + \langle-15,-12,-21\rangle = \langle-30,18,-11\rangle$

2pts

b. $\langle-3,6,2\rangle \cdot \langle5,4,7\rangle = -15 + 24 + 14 = 23$

3pts

c. $\dfrac{\vec{a}\cdot\vec{b}}{|\vec{b}|} \quad \dfrac{\vec{b}}{|\vec{b}|}$

$|\vec{b}| = \sqrt{25+16+49} = \sqrt{90} = 3\sqrt{10}$

$\dfrac{23}{90}\langle5,4,7\rangle = \left\langle \dfrac{115}{90}, \dfrac{92}{90}, \dfrac{161}{90}\right\rangle$

4pts

d.) $\begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ -3 & 6 & 2 \\ 5 & 4 & 7 \end{vmatrix} = \hat{\imath}(42-8) - \hat{\jmath}(-21-10) + \hat{k}(-12-30)$

$= 34\hat{\imath} + 31\hat{\jmath} - 42\hat{k}$

3pts

e.) $\sqrt{34^2 + 31^2 + 42^2} = \sqrt{3881}$

4pts

2.) $W = \vec{F}\cdot\vec{D} = |\vec{F}||\vec{D}|\cos\theta$

$= (35\,lb)(85\,ft)\cos 40°$

$= 2975\cos 40° = 2278.98 = 2279.0\ ft\text{-}lb.$

3pts

3) $P(5,3,-2) \quad Q(4,-1,6) \quad \vec{PQ} = \langle-1,-4,8\rangle$

$x = 5 - t$
$y = 3 - 4t$
$z = -2 + 8t$

4pts

4.) $P(4,-2,3) \quad Q(3,5,1) \quad R(2,6,-3)$

$\vec{PQ} = \langle-1,7,-2\rangle$
$\vec{PR} = \langle-2,8,-6\rangle$

$\begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ -1 & 7 & -2 \\ -2 & 8 & -6 \end{vmatrix} = \hat{\imath}(-42+16) - \hat{\jmath}(6-4) + \hat{k}(-8+14)$

$= -26\hat{\imath} - 2\hat{\jmath} + 6\hat{k}$

$-26(x-4) - 2(y+2) + 6(z-3) = 0$

$-26x + 104 - 2y - 4 + 6z - 18 = 0$

$-26x - 2y + 6z + 82 = 0$