1. §12.2 #38

(2) $P=(-2,0,-2)$, $Q=(4,3,7)$ $\vec{PQ}=\langle 6,3,9\rangle$ $\vec{r}(t)=\langle -2,0,-2\rangle+t\langle 6,3,9\rangle$

2. §12.3 #54

(2) $\vec{u}=\langle 2,-3\rangle$ $\vec{v}=\langle 1,2\rangle$

$$\vec{u}_{\parallel\vec{v}}=\frac{\vec{u}\cdot\vec{v}}{\vec{v}\cdot\vec{v}}\vec{v}=\frac{-4}{5}\langle 1,2\rangle$$

3. §12.3 #64

30pts

$\vec{u}=\langle 3,5\rangle$ $\vec{v}=\langle 8,2\rangle$

$\boxed{4}$ $\vec{u}_{\parallel\vec{v}}=\frac{\vec{u}\cdot\vec{v}}{\vec{v}\cdot\vec{v}}\vec{v}=\frac{34}{68}\langle 8,2\rangle=\langle 4,1\rangle$

$\vec{u}_{\perp\vec{v}}=\vec{u}-\vec{u}_{\parallel\vec{v}}=\langle -1,4\rangle$ so $\|\vec{u}_{\perp\vec{v}}\|=\sqrt{17}$

4. §12.4 #26

$\boxed{2}$ B, C,

5. §12.4 #30

$$\vec{a}\times\vec{b}=\begin{vmatrix}\hat{i}&\hat{j}&\hat{k}\\3&1&1\\-1&2&1\end{vmatrix}=(-1)\hat{i}-(4)\hat{j}+(7)\hat{k}=\langle -1,-4,7\rangle$$ $\|\vec{a}\times\vec{b}\|=\sqrt{66}$

$\boxed{3}$

$\vec{e}_1=\frac{1}{\sqrt{66}}\langle -1,-4,7\rangle$, $\vec{e}_2=\frac{1}{\sqrt{66}}\langle 1,4,-7\rangle$

6. §12.4 #44

$$\vec{PQ}\times\vec{PR}=\begin{vmatrix}\hat{i}&\hat{j}&\hat{k}\\2&3&-2\\0&4&2\end{vmatrix}=(14)\hat{i}-(4)\hat{j}+(8)\hat{k}=\langle 14,-4,8\rangle$$

(2)

so Area of $\triangle_{PQR}=\frac{1}{2}\|\vec{PQ}\times\vec{PR}\|=\frac{1}{2}\sqrt{276}$

7. §12.5 #18

$\vec{PQ}=\langle -4,0,1\rangle$

(2) $\vec{QR}=\langle 1,0,-1\rangle$

$$\vec{PQ}\times\vec{QR}=\begin{vmatrix}\hat{i}&\hat{j}&k\\-4&0&1\\1&0&-1\end{vmatrix}=-3\hat{j}$$

$-3(y-1)=0$

or $y=1$ //

8. §12.5 #26

$\boxed{3}$ $$\begin{vmatrix}\hat{i}&\hat{j}&\hat{k}\\1&2&3\\3&1&8\end{vmatrix}=13\hat{i}+\hat{j}-5\hat{k}$$

$13x+y-5z=0$ //

9. §12.~~7~~ #66

$\phi=\pi/6$ or $\phi=\frac{5\pi}{6}$

(2)

10. §13.2 #34

$\vec{r}(1)=\langle 0,1,9\rangle$

$\boxed{4}$ $\vec{r}\,'(s)=\langle \frac{1}{s},-\frac{1}{s^2},9\rangle$

$\vec{r}\,'(1)=\langle 1,-1,9\rangle$

so $\vec{L}(t)=\langle 0,1,9\rangle+t\langle 1,-1,9\rangle$