Calculus 251:C3 Worksheet 12.1-12.2

(1) For each pair P, Q, find the components of $\overrightarrow{PQ}$ and calculate $\left\|\overrightarrow{PQ}\right\|$

(a) $P = (-3, -5)$, $Q = (4, -6)$

(b) $P = (2e, 1 - 2\pi)$, $Q = (2e + \pi, 1 + \pi)$

(c) $P = (3, -8, 2)$, $Q = (7, 4, -7)$

(d) $P = (1, 2, 3, 4)$, $Q = (3, -1, 5, -1)$ [*Note:* Yes, this problem is in $\mathbb{R}^4$]

(2) Perform the indicated vector operation.

(a) $\langle -4, 6\rangle - \langle 2, -3\rangle$

(b) $\langle 3, 8, \pi\rangle + 2\langle 2, -4, -2\pi\rangle$

(c) $2(3\hat{\mathbf{i}} - 2\hat{\mathbf{j}}) - 3(\hat{\mathbf{i}} + 3\hat{\mathbf{j}} - 2\hat{\mathbf{k}})$

(d) $\langle \sin^2(\frac{\pi}{7}), \ln 27, \sqrt{2}\rangle - \langle -\cos^2(\frac{\pi}{7}), \ln 9, \sqrt{3}\rangle$

(3) Find the unit vector $\vec{e}_{\vec{v}}$ where $\vec{v} = 2\hat{\mathbf{i}} - 3\hat{\mathbf{j}}$

(4) Find the vector $\vec{v}$ which satisfies the equation $3\vec{v} - \langle 3, 2, -5\rangle = \langle 0, 1, 2\rangle$

(5) Let $\vec{u} = \langle 1, 3\rangle$, $\vec{v} = \langle 1, -1\rangle$, and $\vec{w} = \langle 3, 1\rangle$. Write $\vec{u}$ as a linear combination of $\vec{v}$ and $\vec{w}$.

(6) Find the magnitudes of the forces on cables 1 and 2 in the following diagram: