D.1 – The location of two points with respect to the origin are specified by the position vectors \( \mathbf{r}_A \) and \( \mathbf{r}_B \). Determine the angle, \( \theta \), between these two position vectors.

\[
\mathbf{r}_A = -3.46 \hat{i} + 21.3 \hat{j} - 13.9 \hat{k} \text{ ft}
\]
\[
\mathbf{r}_B = 10.7 \hat{i} - 12.9 \hat{j} - 13.0 \hat{k} \text{ ft}
\]

This is a diagram of the “generic” problem.

D.2 – Determine the magnitudes of the components of the force vector, \( \mathbf{F} \), that act parallel and perpendicular to the line defined by points A and B.

Also express the parallel component as a Cartesian vector, \( \mathbf{F}_1 \).

\( A \equiv (7, -2, 9) \text{ m} \)
\( B \equiv (-3, 3, 3) \text{ m} \)
\( \mathbf{F} = 784 \hat{i} - 128 \hat{j} - 744 \hat{k} \text{ N} \)
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E.1 – The location of two points with respect to the origin are specified by the position vectors \( \mathbf{r}_A \) and \( \mathbf{r}_B \). Determine the angle, \( \theta \), between these two position vectors.

\[
\mathbf{r}_A = 15.4 \hat{i} - 9.16 \hat{j} + 19.2 \hat{k} \text{ ft}
\]

\[
\mathbf{r}_B = -4.41 \hat{i} - 9.76 \hat{j} - 18.5 \hat{k} \text{ ft}
\]

This is a diagram of the “generic” problem.

E.2 – Determine the magnitudes of the components of the force vector, \( \mathbf{F} \), that act parallel and perpendicular to the line defined by points A and B.

Also express the parallel component as a Cartesian vector, \( \mathbf{F}_p \).

\[
A = (2, 10, 5) \text{ m}
\]

\[
B = (0, -10, 10) \text{ m}
\]

\[
\mathbf{F} = 463 \hat{i} + 619 \hat{j} - 439 \hat{k} \text{ N}
\]

This is a diagram of the “generic” problem.
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F.1 – The location of two points with respect to the origin are specified by the position vectors \( \mathbf{r}_A \) and \( \mathbf{r}_B \). Determine the angle, \( \theta \), between these two position vectors.

\[
\mathbf{r}_A = -23.9 \hat{i} + 1.48 \hat{j} - 17.0 \hat{k} \text{ ft}
\]
\[
\mathbf{r}_B = 3.01 \hat{i} + 11.7 \hat{j} - 10.3 \hat{k} \text{ ft}
\]

This is a diagram of the “generic” problem

F.2 – Determine the magnitudes of the components of the force vector, \( \mathbf{F} \), that act parallel and perpendicular to the line defined by points A and B.

Also express the parallel component as a Cartesian vector, \( \mathbf{F}_p \).

\[
A = (2, 15, 7) \text{ m}
\]
\[
B = (-2, -6, -3) \text{ m}
\]
\[
\mathbf{F} = -341 \hat{i} - 842 \hat{j} + 246 \hat{k} \text{ N}
\]

This is a diagram of the “generic” problem