Homework H3.A

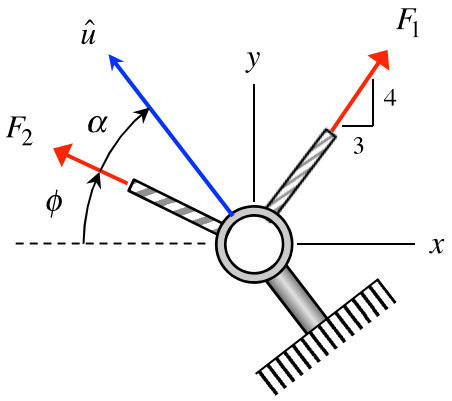
Given: Cable forces $\vec{F}_1$ and $\vec{F}_2$ act concurrently on the ring shown. Let $\vec{R} = \vec{F}_1 + \vec{F}_2$ represent the resultant of these two cable forces, and let $\vec{R}_u$ represent the vector projection of $\vec{R}$ onto the direction defined by the unit vector $\vec{u}$ shown.

Find:

a) Determine the vector $\vec{R}_u$ by directly projecting $\vec{R}$ onto $\vec{u}$.

b) Determine the vector $\vec{R}_u$ by individually projecting $\vec{F}_1$ and $\vec{F}_2$ onto $\vec{u}$ and adding together these vector projections.

Use the following parameter value in your analysis: F_1 = 5 kN, F_2 = 4 kN, ϕ = 30° and α = 10°.



Homework H3.B

Given: Cables BD and CD are attached to corners B and C, respectively, of a hinged door and exert forces of $\vec{F}_{BD}$ and $\vec{F}_{CD}$, respectively, on the door due to their tensions. The tensions in cables BD and CD are known to be T and $2T$, respectively. The door hinges are locked so that these cable loads on the door result from pre-tensioning.

Find:

a) Write out the force vectors $\vec{F}_{BD}$ and $\vec{F}_{CD}$ in terms of their Cartesian components.

b) Determine the vector projection of $\vec{F}_{BD}$ onto cable CD.

c) Determine the vector projection of $\vec{F}_{CD}$ onto cable BD.

d) Determine the angle α that exists between cables BD and CD.

Use the following parameter value in your analysis: $\phi = 60°$.