

Problem F2.23 (Textbook, page 63). Determine the magnitude of the resultant force at point A

$$A(0, 0, 6)$$

$$B(3, -2, 0)$$

$$C(2, 3, 0)$$

$$\hat{u}_{F_B} = \frac{\vec{r}_{B/A}}{|\vec{r}_{B/A}|} = \frac{[3 \ -2 \ -6]}{\sqrt{3^2 + (-2)^2 + (-6)^2}}$$

$$\hat{u}_{F_B} = \left[\frac{3}{7} \ - \frac{2}{7} \ - \frac{6}{7} \right]$$

$$\vec{F}_B = |\vec{F}_B| \hat{u}_B = 840 \left[\frac{3}{7} \ - \frac{2}{7} \ - \frac{6}{7} \right] = [360 \ -240 \ -720] \text{ N}$$

$$\hat{u}_{F_C} = \frac{\vec{r}_{C/A}}{|\vec{r}_{C/A}|} = \frac{[2 \ 3 \ -6]}{\sqrt{2^2 + 3^2 + (-6)^2}} = \left[\frac{2}{7} \ \frac{3}{7} \ - \frac{6}{7} \right]$$

$$\vec{F}_C = |\vec{F}_C| \hat{u}_C = 420 \left[\frac{2}{7} \ \frac{3}{7} \ - \frac{6}{7} \right] = [120 \ 180 \ -360] \text{ N}$$

Resultant force at A:

$$\vec{R} = \vec{F}_B + \vec{F}_C = [360 \ -240 \ -720] + [120 \ 180 \ -360]$$

$$\vec{R} = [480 \ -60 \ -1080] \text{ N}$$

$$|\vec{R}| = \sqrt{480^2 + (-60)^2 + (-1080)^2} = 1183 \text{ N}$$

$$|\vec{R}| = \underline{\underline{1.183 \text{ kN}}}$$

Ans.

