18. If we write $\vec{r} = x\hat{\mathrm{i}} + y\hat{\mathrm{j}} + z\hat{\mathrm{k}}$, then (using Eq. 3-30) we find $\vec{r} \times \vec{F}$ is equal to

$$(yF_z - zF_y)\,\hat{\mathrm{i}} + (zF_x - xF_z)\,\hat{\mathrm{j}} + (xF_y - yF_x)\,\hat{\mathrm{k}}\ .$$

(a) In the above expression, we set (with SI units understood) $x = -2$, $y = 0$, $z = 4$, $F_x = 6$, $F_y = 0$ and $F_z = 0$. Then we obtain $\vec{\tau} = \vec{r} \times \vec{F} = 24\,\hat{\mathrm{j}}$ N·m.

(b) The values are just as in part (a) with the exception that now $F_x = -6$. We find $\vec{\tau} = \vec{r} \times \vec{F} = -24\,\hat{\mathrm{j}}$ N·m.

(c) In the above expression, we set $x = -2$, $y = 0$, $z = 4$, $F_x = 0$, $F_y = 0$ and $F_z = 6$. We get $\vec{\tau} = \vec{r} \times \vec{F} = 12\,\hat{\mathrm{j}}$ N·m.

(d) The values are just as in part (c) with the exception that now $F_z = -6$. We find $\vec{\tau} = \vec{r} \times \vec{F} = -12\,\hat{\mathrm{j}}$ N·m.