

3. (a) The forces are balanced when they sum to zero:  $\vec{F}_1 + \vec{F}_2 + \vec{F}_3 = 0$ . This means

$$\vec{F}_3 = -\vec{F}_1 - \vec{F}_2 = -(10\text{ N})\hat{i} + (4\text{ N})\hat{j} - (17\text{ N})\hat{i} - (2\text{ N})\hat{j} = (-27\text{ N})\hat{i} + (2\text{ N})\hat{j} .$$

- (b) If  $\theta$  is the angle the vector makes with the  $x$  axis then

$$\tan \theta = \frac{F_{3y}}{F_{3x}} = \frac{2\text{ N}}{-27\text{ N}} = -0.741 .$$

The angle is either  $-4.2^\circ$  or  $176^\circ$ . The second solution yields a negative  $x$  component and a positive  $y$  component and is therefore the correct solution.