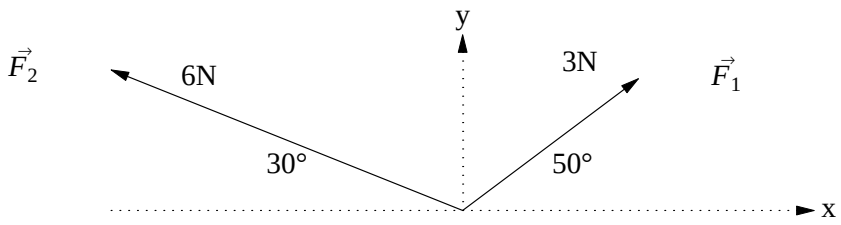
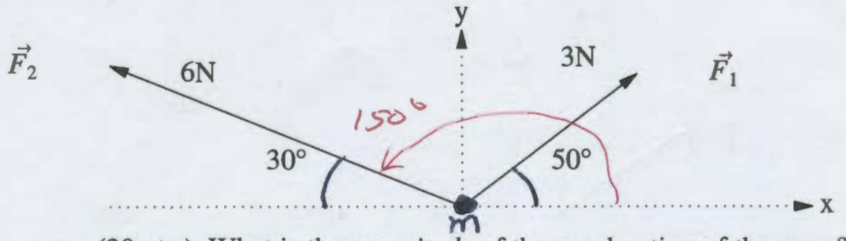
4. (25 pts.) A 7kg mass on a frictionless horizontal surface is subjected to two forces as shown in the following diagram.



a. (20 pts.) What is the *magnitude* of the acceleration of the mass?

b. (5 pts.) What is the *direction* of the acceleration of the mass?

4. (25 pts.) A 7kg mass on a frictionless horizontal surface is subjected to two forces as shown in the following diagram.



a. (20 pts.) What is the *magnitude* of the acceleration of the mass?

$\Sigma \vec{F} = m\vec{a}$

x-components: $F_1 \cos 50^\circ + F_2 \cos 150^\circ = m a_x$

$a_x = \dfrac{3\cos 50^\circ + 6\cos 150}{7} = -0.467\ m/s^2$

y-components: $F_1 \sin 50^\circ + F_2 \sin 150^\circ = m a_y$

$a_y = \dfrac{F_1 \sin 50^\circ + F_2 \sin 150^\circ}{m} = \dfrac{3\sin 50^\circ + 6\sin 150^\circ}{7}$

$a_y = 0.757\ m/s^2$

$a = \sqrt{a_x^2 + a_y^2} = \boxed{0.889\ m/s^2}$

b. (5 pts.) What is the *direction* of the acceleration of the mass?

$\theta = \tan^{-1}\left(\dfrac{a_y}{a_x}\right) = \tan^{-1}\left(\dfrac{0.757}{-0.467}\right) = \boxed{122^\circ}$

(-58° would be wrong quadrant)