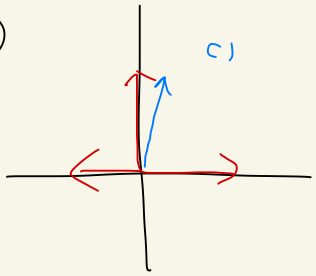
## Ex 1

a)



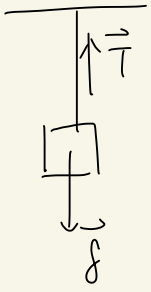

b) $\Sigma \vec{F} = \begin{bmatrix} 10 \\ 60 \end{bmatrix} N$

d) $5 \times \begin{bmatrix} 1 \\ 6 \end{bmatrix} = \begin{bmatrix} 5 \\ 30 \end{bmatrix} \frac{kgm}{s}$

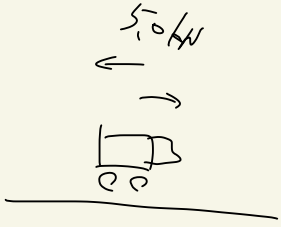
e) $\begin{bmatrix} 1 \\ 6 \end{bmatrix} \frac{kgm}{s}$ f) $\begin{bmatrix} 0 \\ 10 \end{bmatrix} + \begin{bmatrix} 3 \\ 12 \end{bmatrix} + \begin{bmatrix} 2 \\ 22 \end{bmatrix}$

## Ex 2

a)



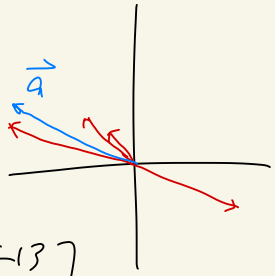

b)




## Ex 3

$\Sigma \vec{F} = \begin{bmatrix} -6 \\ 3 \end{bmatrix} N$

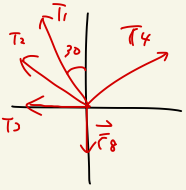
b)




$\vec{P_1} = \begin{bmatrix} 5 \\ 8 \end{bmatrix} + t \begin{bmatrix} -6 \\ 3 \end{bmatrix} = \begin{bmatrix} -13 \\ 9 \end{bmatrix}$

$t = 3$

## Ex 4




$T_1 = 10 \quad T_2 = 12 \quad T_3 = 8.8$

$\Sigma \vec{F} = 0 = \begin{bmatrix} 10\cos 120 \\ 10\sin 120 \end{bmatrix} + \begin{bmatrix} 12\cos 135 \\ 12\sin 135 \end{bmatrix} + \begin{bmatrix} 8.8\cos 180 \\ 8.8\sin 180 \end{bmatrix} + T_4 + \begin{bmatrix} 0 \\ -9.8 \times 4 \end{bmatrix}$

$= \begin{bmatrix} -5 \\ 5\sqrt{3} \end{bmatrix} + \begin{bmatrix} 6\sqrt{2} \\ 6\sqrt{2} \end{bmatrix} + \begin{bmatrix} -8.8 \\ 0 \end{bmatrix} + T_4 + \begin{bmatrix} 0 \\ -9.8 \times 4 \end{bmatrix} = 0$

$T_4 = \begin{bmatrix} 6\sqrt{2} + 13.8 \\ 5\sqrt{3} - 6\sqrt{2} + 39.2 \end{bmatrix} = \begin{bmatrix} 22.3 \\ 22.1 \end{bmatrix} N \quad \approx 44.9^\circ$

## Problem 4-5

a) $\vec{F} = \begin{bmatrix} 51 \\ 0 \end{bmatrix} - \begin{bmatrix} -24 \\ 0 \end{bmatrix} = \begin{bmatrix} 75 \\ 0 \end{bmatrix} N$

b) $v_x^2 - v_{x0}^2 = 2a\Delta x$ $\quad \vec{F} = ma$

$0 - 1.5^2 = -2a\Delta x$ $\quad -24 = 24a$

$a = -1$

$\frac{225}{2} = \Delta x$ $\quad \Delta x = 11 m$

## Problem 4-6

2100kg → ← $\vec{a}\begin{bmatrix} -196 \\ 0 \end{bmatrix} m/s^2$ $\quad \vec{F} = m\vec{a}$

$\vec{F} = 2100 \times -196$

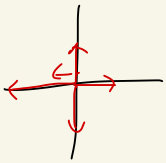
$= -411600$

$f_k = \Sigma\vec{F}$

## Problem 4-9

$F_1 \rightarrow$ [ ] $\leftarrow F_2$ $\quad F_1 = 75, \; F_2 = -90$

$f_k = 12$



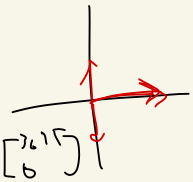
b) $\Sigma\vec{F} = -27$ $\quad m = 23.0$

$a = -\frac{27}{23} m/s = -1.17 m/s^2$

$-15 \quad \Sigma\vec{F} = 70 \quad \frac{-70}{27} = -1.30$

## Problem 4-11

$\vec{a} = \begin{bmatrix} 49 \\ 0 \end{bmatrix} m/s^2$ $\quad m = 75 kg$

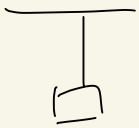


$75 \times 49 = \begin{pmatrix} 3675 \\ 736 \end{pmatrix} N$ $\quad \vec{F} = \begin{bmatrix} 3675 \\ 0 \end{bmatrix}$

## Problem 4-18

$m = 45 kg$ $\quad \vec{a} = \begin{bmatrix} 0 \\ 9.5 \end{bmatrix} m/s$ $\quad 45 \times 9.5$

$\vec{F} = \begin{bmatrix} 0 \\ 45 \times 9.5 + 45 \times 9.8 \end{bmatrix} = \begin{bmatrix} 0 \\ 779 \end{bmatrix} N$



2.0kg

$g = 10$

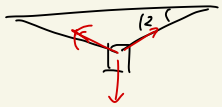
a) $T = 20$  b) $T = 0$  c) $T = 12$

d) $T = 20$  e) $T = 20$  f) $T = -30$

Problem 4-19

$T = 8 \times 10^{-5} \times 9.8$

b)




$$T_y = 4 \times 10^{-5} \times 9.8$$

$$T \sin 12^\circ = 4 \times 10^{-5} \times 9.8$$

$$T = \frac{40.2 \times 10^{-5}}{\sin 12} = 1.93 \times 10^{-3}$$