Mechanics Hw 1

Mechanics TW I

Ryan Conne

$$\vec{F} = \sum_{n} \vec{F}_{n} + \vec{F}_{n} = \vec{P}_{n}$$

$$= \sum_{n} \vec{F}_{n} + \vec$$

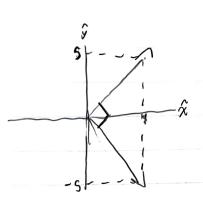
2.
$$\vec{a} \cdot \vec{b} = |\alpha| |\beta| (os(\alpha - \beta))$$

 $\vec{a} \cdot \vec{b} = |\alpha| (os\alpha) (|b| (os\beta) + (|a| sin\alpha) (|b| sin\beta)$
 $|\alpha| |b| (os(\alpha - \beta)) = |\alpha| |b| (cos\alpha cos\beta + sind sin\beta)$
 $(os(\alpha - \beta)) = (osd cos\beta + sind sin\beta)$

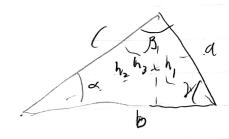
$$\begin{array}{lll}
\hat{a} \times \hat{b} &= |a||b| \sin(\beta - \alpha) \hat{k} \\
&= |\hat{i} \hat{j} \hat{k}| \\
&= |\hat{a}, a_{3} 0| = |\hat{k} (a_{x} b_{y} - a_{y} b_{x}) \\
|\hat{b}_{x} b_{3} 0| = |a||b| (eos a sin \beta - sin a cos \beta) \\
&= |\hat{a}, a_{3} 0| = |a||b| (eos a sin \beta - sin a cos \beta) \\
&= |\hat{a}, a_{3} 0| = |a||b| (eos a sin \beta - sin a cos \beta) \\
&= |\hat{a}, a_{3} 0| = |a||b| (eos a sin \beta - sin a cos \beta) \\
&= |a||b| \sin(\beta - \alpha) = |a||b| \sin(\beta - \alpha) \\
&= |a||b| \sin(\beta - \alpha) = |a||b| \sin(\beta - \alpha) \\
&= |a||b| \sin(\beta$$

3.
$$\vec{b} \cdot \vec{c} = 0$$

= $i - s^2$
 $s = \pm 1$



4.



(a)
$$A = \frac{1}{2}bh_1 = \frac{1}{2}ah_2 = \frac{1}{2}ch_3$$
 $h_1 = dsihy = csih \lambda$
 $h_2 = csin\beta$
 $A = \frac{1}{2}absiny = \frac{1}{2}besin \lambda = \frac{1}{2}acgin\beta$
 $|axb| = absiny$
 $|axc| = bcsin \lambda$
 $|axc| = acsin \beta$
 $A = \frac{1}{2}|axb| = \frac{1}{2}|bxc| = \frac{1}{2}|axc|$

(b)
$$[axb] = [bxc] = [axc]$$
 $absiny = acsinB$
 $sing = siny$
 $absiny = bcsina$
 $sina = siny$
 $sina = siny$
 $sina = siny$
 $sina = siny$
 $sina = siny$

$$\hat{x} = \hat{r} \cos \phi \quad \hat{y} = \hat{r} \sin \phi$$

$$\hat{r} = \hat{r} (\cos \phi + \sin^2 \phi)$$

$$= \hat{r} \cos \phi \cos \phi + \hat{r} \sin \phi \sin \phi$$

$$= \hat{\chi} \cos \phi + \hat{y} \sin \phi$$

$$\hat{r} = 0$$

$$\hat{r} = -\hat{\chi} \sin \phi + \hat{y} \cos \phi$$

(b)
$$\hat{r} = (-\hat{x} \sin \phi + \hat{y} \cos \phi) \phi$$

$$= \hat{\phi} \hat{\phi}$$

$$\hat{\sigma} = (-\hat{x} \cos \phi - \hat{y} \sin \phi) \hat{\phi}$$

$$= -\hat{\phi} \hat{r}$$

6.
$$\hat{x} = \hat{p} \cos \phi$$
 $\hat{y} = \hat{p} \sin \phi$ $\hat{z} = \hat{z}$

$$\hat{p} = \hat{p} \cos^2 \phi + \hat{p} \sin^2 \phi$$

$$= \hat{x} \cos \phi + \hat{y} \sin \phi$$

$$\hat{z} = \hat{z}$$

$$\hat{z} = \hat{z}$$

$$\hat{z} = -\hat{x} \sin \phi + \hat{y} \cos \phi$$

$$\hat{z} = -\hat{y} \cos \phi - \hat{y} \sin \phi$$

$$\hat{z} = -\hat{y} \cos \phi - \hat{y} \sin \phi$$

$$\hat{z} = -\hat{y} \cos \phi - \hat{y} \sin \phi$$

$$\hat{z} = -\hat{y} \cos \phi - \hat{y} \sin \phi$$

7.
$$\frac{df}{dt} = f$$

$$\int_{f} \frac{df}{dt} = \int_{f} dt$$

$$\int_{f} \frac{df}{dt} = \int_{f} dt$$

$$\begin{cases} f_s = \mu_s & m_{A'}g = m_{B'}g \\ m_{B'} = \mu_s & m_{A'} \end{cases}$$

9.
$$f_{net} = m_B g - f_K$$

$$= m_B g - M_K m_A g$$

$$= \frac{F_{net}}{m_A + m_B} + \frac{m_B g}{m_A + m_B} + \frac{m_B g}{m_B + m_B g}$$

(b)
$$f_s = M_s g m_A \cos \theta$$

 $f_s \ge m_A g \le m_B \theta - m_B g \le m_B \theta$
 $M_s \ge \frac{m_A \sin \theta - m_B g m_B \theta}{m_A \cos \theta}$

(C)
$$N_B = (m_A + m_B) g \sin B$$

 $N_A = m_A g \sin B$

