## Homework \# 1

Q1:
Consider a mass $m$ connected to a spring with a stiffness constant $k$. If the frequency $f_{0}$ of such spring is given by:

$$
f_{0}=\frac{1}{2 \pi} \sqrt{\frac{k}{m}}
$$

1- Use the Dimensional analysis to find the dimensions of the spring constant $k$.
2- Compare these dimensions of $k$ with those can be obtained from Hook's Law:

$$
F=-k x
$$

## Q2:

Suppose the position vector of a particle moves on a circle is given by:

$$
\mathbf{r}=\mathbf{i} b \sin \omega t+\mathbf{j} b \cos \omega t
$$

where $\omega$ is a constant.
Show that the acceleration vector a of this motion is $\perp$ to the velocity vector $\mathbf{v}$.

## Q3:

Solve the following problems from your textbook:

## 1.2, 1.4, 1.7, 1.10, 1.18, 1.20 \& 1.30

## Hints:

1.4- Use the shown cube as an example.

1.30- By finding the dot and the cross product of the two shown vectors $\mathbf{a}$ and $\mathbf{b}$.


