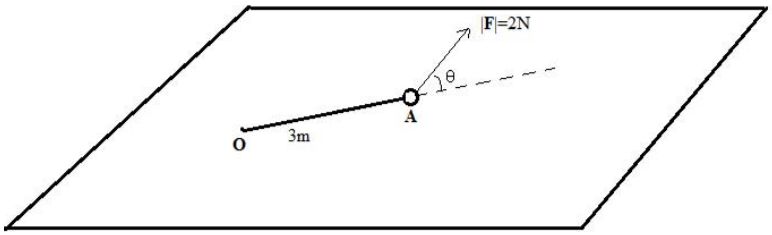
234 Quiz 1 (Group)

Section: *Name:*

15 minutes. Each problem has 5 points. There's a bonus problem on back.

1. As shown, a ball (A) is attached at the end of one string. The length of the string is $3m$. A force with size $2N$ is acting on the ball. $\theta = \pi/3$. Assuming O is picked as the reference point, we see that the position vector of A is $\vec{r} = \overrightarrow{OA}$. The torque acting on the ball is defined to be $\vec{T} = \vec{r} \times \vec{F}$. Draw the torque(roughly show the direction) in the figure and indicate the size of the torque(the magnitude of the torque vector).



2. Given three vectors

$$\vec{a} = \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}, \ \vec{b} = \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}, \ \vec{c} = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}$$

compute the determinant $det(\vec{a}, \vec{b}, \vec{c}) = \vec{a} \cdot (\vec{b} \times \vec{c})$

Bonus: Suppose $|\vec{u}| = 2, |\vec{v}| = 1$. The angle θ between $\vec{u}, \vec{v}$ satisfies $\cos\theta = 1/6$. Find the length of $2\vec{u} + 3\vec{v}$. (2 pts)