

# Rotational Dynamics Lab

## Procedure

Briefly, but completely, describe the procedure for this lab – and include a labeled sketch.

## Data

Disc Mass ( $M$ )	
Disc Radius ( $R$ )	
Tension Radius ( $r$ )	

$m_{hang}$	$\alpha$

$a$	$T$	$\tau$

## Graphs

Using appropriate scales, labels and units, graph  $\tau$  vs  $\alpha$ . Draw a best-fits line.

## Questions

- Using the moment of inertia definition and calculus, **derive** the equation for the moment of inertia for the disc in terms of  $M$  and  $R$ . Then, use your measurements to calculate the value  $I_{disc}$ .
- Use a rotational-linear relationship to find  $a$ . Use a FBD for the hanging mass to derive an equation for Tension ( $T$ ). Fill in your data table and show one example of your work.
- Derive an equation for Torque ( $\tau$ ) in terms of  $T$  and  $r$ . Fill in your data table and show one example of your calculation.
- Find the equation of your best-fits line. Use your answer to find an experimental value for  $I_{disc}$ . Show your work.
- Use your calculated value for the moment of inertia for the disc from #1 as the accepted value, and find the percent error for your experimental value from #4.

## Error Analysis

Thoroughly explain what the main sources of error are for this lab, and how you would correct them.

