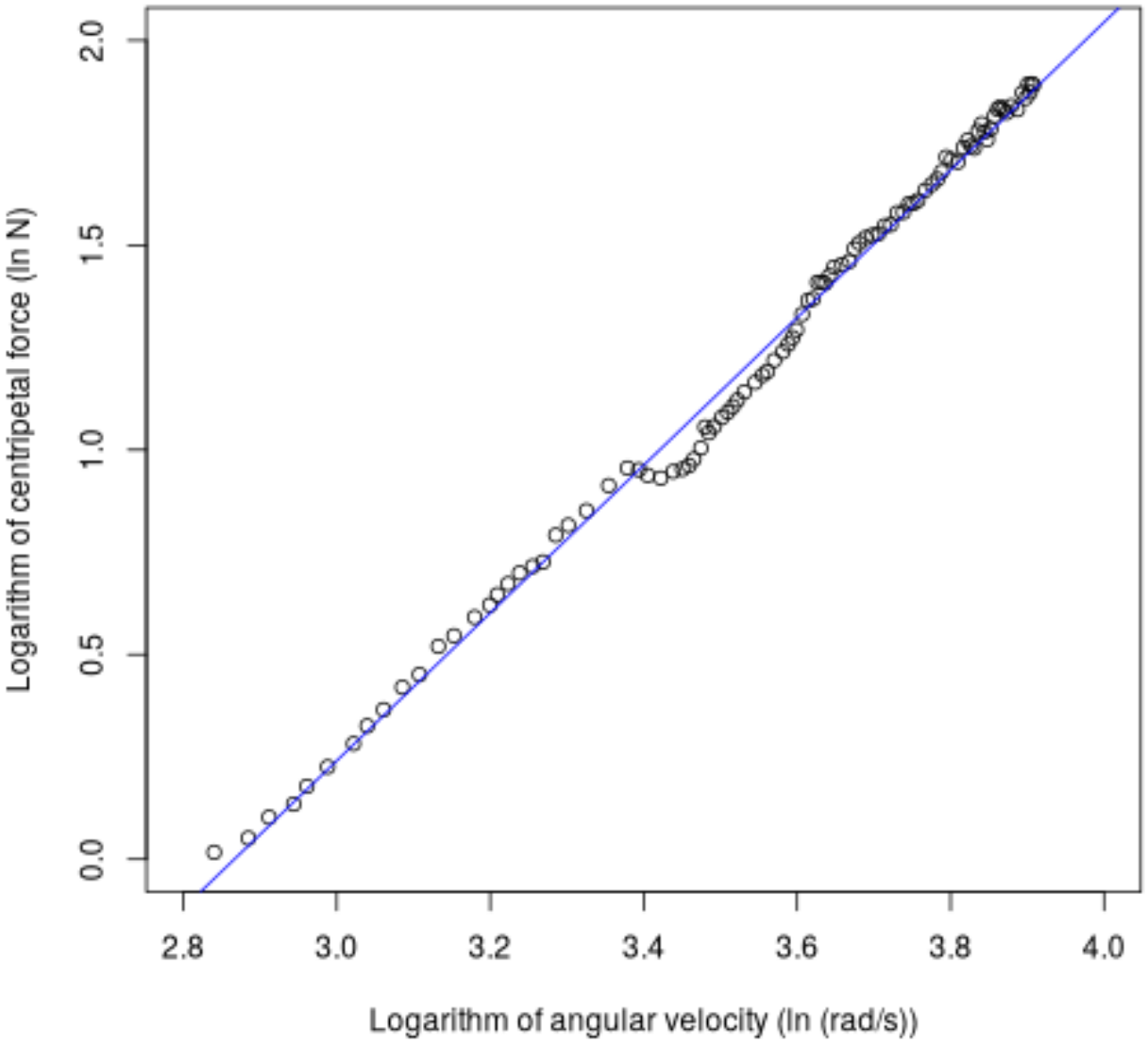
Name		LA ( )

B. Results and data analysis (52 pts)

Part I. Centripetal force vs. Angular velocity at fixed values of *M and R* (26 pts)

Mass of the free mass holder = 3.78 g

Paste the logarithm of the centripetal force versus the logarithm of the angular velocity graph here and record the fitting results.



intercept: -5.17

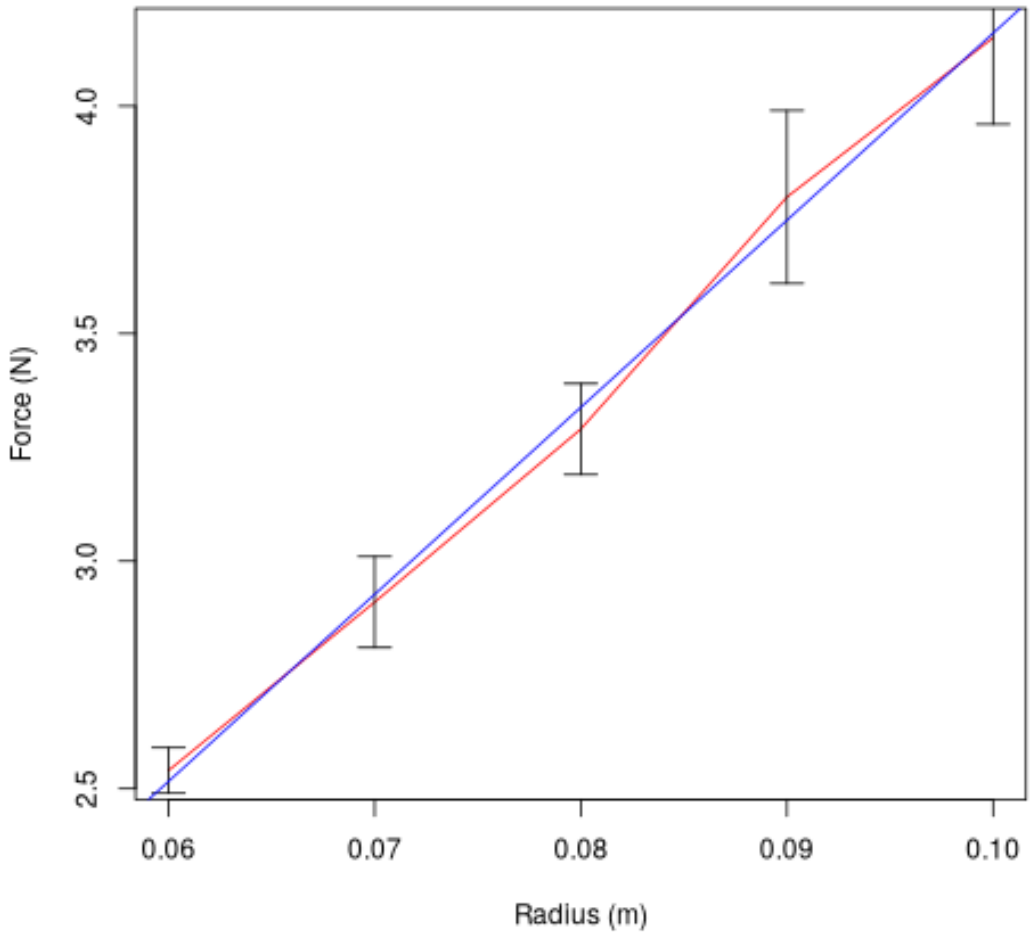
slope: 1.80

Part II. Centripetal force vs. Radius at fixed values of *M and ω* (26 pts)

Table 1

Radius (m)	Centripetal force (N)	
	Mean	Standard deviation
0.06	2.54	0.05
0.07	2.91	0.10
0.08	3.29	0.10
0.09	3.80	0.19
0.10	4.15	0.19

Paste the centripetal force versus radius graph here and record the fitting results.



intercept: 0.05

slope: 41.1

TA signature: ZHANG Wenyi

C. Answer the following questions after the experiment (6 pts each)

5. In Part I of the experiment, compare the fitted values of the intercept and slope with the expected theoretical values. Calculate the percent error.

$F = mR\omega^2 \rightarrow \log F = \log(mR) + 2(\log \omega)$

measured: -5.17 (intercept) theoretical: -6.03

measured: 1.80 (slope)

% error in slope: $\frac{|2 - 1.80|}{2} \cdot 100\% = 10\%$

% error in intercept: $\frac{|-6.03 - (-5.17)|}{6.03} \cdot 100\% = 14\%$

6. Discuss the possible sources of error in this part of the experiment.

One source of error might be the uncertainty in R, since it is difficult to set it to 8cm exactly, and during rotation the radius may have extended a little.
Then, the free and fixed masses were not perfectly calibrated, resulting in perturbations and less accurate measurements.

7. In Part II of the experiment, compare the fitted values of the slope and the intercept with the expected theoretical values. Calculate the percent error of the slope.

During the experiment, the fixed angular velocity was 37 rad s^{-1} instead of 35 rad s^{-1}, since it was easier to set 37 on the equipment. I will use 37 for theoretical calculations.

	theoretial	measured	% error
slope	41.07	41.1	0.07%
intercept	0	0.05	100% ...

8. Would the percent error of the slope and intercept decrease if the free mass was increased (in the experiment, the value of the free mass is fixed)? Explain your answer.

I expect the percentage error to decrease with increased mass, since the mass will increase relative to the masses of the equipment, and those masses will have a smaller relative effect, producing smaller systematic errors.