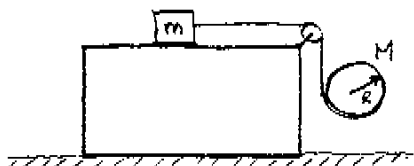


PRACTICE MIDTERM PROBLEMS

1

A DISK OF MASS M AND RADIUS R UNWINDS FROM A MASSLESS STRING. THE STRING PASSES OVER A MASSLESS PULLEY AND IS ATTACHED TO A BLOCK OF MASS m , SITTING ON A FRICTIONLESS TABLE.



- (A) FIND THE ACCELERATIONS OF m AND M .
- (B) FIND ANGULAR ACCELERATION OF THE DISK.
- (C) FIND THE TENSION IN THE STRING.

2

A UNIFORM BAR OF MASS m AND LENGTH l IS PIVOTED AT ONE END AND STARTS TO FALL DOWN FROM THE VERTICAL POSITION. FIND THE FORCE ACTING ON THE BAR AT THE PIVOT WHEN $\theta = 90^\circ$.



3

A WHEEL OF MASS m AND RADIUS R IS ATTACHED TO THE END OF A SPRING WITH SPRING CONSTANT k . THE OTHER END OF THE SPRING IS FIXED TO A BLOCK OF MASS M . IF THE WHEEL ROLLS W/O SLIPPING ON THE SURFACE OF THE BLOCK, FIND THE OSCILLATION FREQUENCY ω . THE BLOCK MOVES FREELY ON A FRICTIONLESS SURFACE.

