

Name: [5 pts]

1) We have a rope which breaks if the tension force is equal to  $T_c$ . We connect this rope to a mass  $m$  and rotate it on a vertical plane on a circular path with radius  $r$ , as shown in fig. 1.

- a) Name the forces acting on the mass  $m$ . [2 pts]
- b) How much work each force does while the mass travels from  $A$  to  $B$ ? [2 pts]
- c) If the velocity at  $A$  is  $v_A$ , find the velocity at point  $B$ , in terms of  $v_A$  and the radius of the circle,  $r$ . [2 pts]
- d) Write the equation of motion at point  $A$  and find the condition on  $v_A$  so that the rope does not break. [2 pts]
- e) Write the equation of motion at point  $B$  and find the condition on  $v_B$  so that the rope is not loose. [2 pts]
- f) Find the condition on  $T_c$  so that the rope does not break at  $A$  and does not become loose at  $B$ . [1 pt]

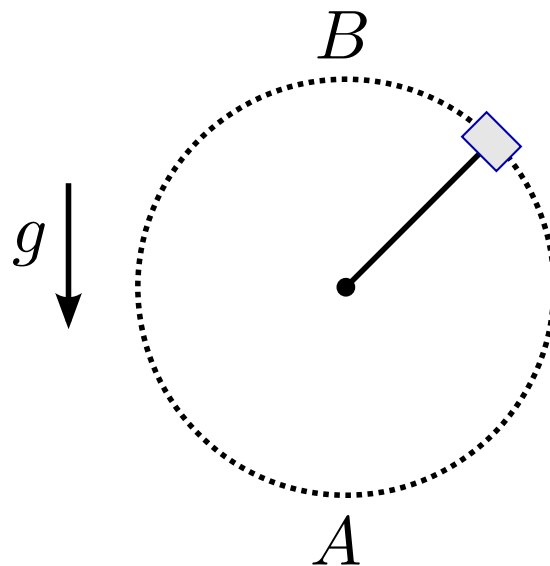


Figure 1: The mass  $m$  traveling a vertical circle.