2.   (a)   A 2.5 kg block is placed on a horizontal rotating disk with a radius of 0.5 m. The disk rotates at a constant angular speed of 3 rad/s. The block is located 0.3 m from the centre of the disk. The coefficient of static friction between the block and the disk is 0.4.

Calculate the maximum static frictional force that can act on the block.   [2 marks]

(b)   Determine whether the block will slide or stay in place as the disk rotates.
[3 marks]

(c) If the block remains stationary relative to the disk, calculate the minimum coefficient of friction required for the block to stay in place if it were moved to the edge of the disk (0.5 m from the centre). [2 marks]

(d) If the block is now moved to the edge (0.5 m from the centre) and the coefficient of friction remains 0.4, determine the speed of the block when it begins to slip relative to the rotating disk. [3 marks]