## EP375 – MT2 – PROBLEMS FOR GROUP 3 STUDENTS

**[1].** In the given figure, the coefficient of static friction between the inclined plane and mass m1 is  $\mu$ . Assume that the pulleys are frictionless and have no masses. Write MATLAB GUI, to perform a simulation and animation of the system for the given m1 and m2.



[2]. Magnetic field around a long-wire carrying current *i* can be calculated from:

$$B(r) = \frac{\mu_0 i}{2\pi r}$$

where *r* is the distance measured form the wire and is the magnetic permeability constant. Table shows the experimental results of the measured magnetic fields, *B*, corresponding to the distance *r*. The current in the wire is i = 1A.

Write a program to determine value of  $\mu_0$ 

(a) by using LSF method

(b) by using fminsearch() function

(c) by using Monte Carlo method.

Your program must plot both the data and fitting functions on the same axis.

**[3].** A woman has N children, the probability of each child being female is 50%. Write a program to determine the probability for N = 1, 2, 3, ..., 12. Use a billon random events.

[4]. Using sound card, write a Matlab GUI to measure the gravitational acceleration using a simple pendulum.

[5]. Write a program to perform any project that uses the sound card.

r	B
	-+
10.0	2.0 +- 0.5
20.0	1.0 +- 0.4
30.0	0.6 +- 0.2
40.0	0.5 +- 0.1
50.0	0.4 +- 0.1
r is	measured in cm
B is	measured in $\mu T$