Prof. Dr. N. Onur
Dr. E. Özgirgin Yapıcı
SP 2019

Çankaya University
Mechanical Engineering Department
ME 102 Mechanical Engineering Orientation
HW 1

Q-1 a) What will be the weight of a 85 kg person on a space satellite where the gravitational acceleration is 70 % of value on earth? (on earth, g=9.81 m/s^2).
b) How much force is required to accelerate a mass of 150 lbm at a constant acceleration of 7 ft/sec^2?

Q-2 Determine if the following equation is dimensionally consistent: $F=\frac{1}{2}\rho g \Delta x^2$

Where; F is force, ρ is density, x is distance, g is gravitational constant.

Q-3 What is the number of significant figures for each quantity?

a) 1.2456
b) 1.4x10^{-2}
c) 25478

Q-4 Write the measurement result considering **smallest scale division** of thermometer and the **least count** for the thermometer.

Q-5 Temperature of a surface is measured 6 times by a thermocouple as seen below:

Measurement no	**1**	**2**	**3**	**4**	**5**	**6**
Value (°C)	**18.03**	**18.12**	**17.94**	**18.34**	**17.89**	**18.10**

a) Calculate the arithmetic average of the data.
b) Calculate deviations for each data.
c) Calculate the absolute errors and the relative errors for each data.

Q-6 Measurement of length of an object is done and following data is collected:

Measurement no	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Value (cm)	**1.23**	**1.25**	**0.98**	**0.89**	**1.05**	**1.12**	**1.02**	**0.95**

a) Compute the mean value.
b) Find the deviations from the mean value.
c) Calculate the standard deviation (root mean square deviation)
d) Find the variance (square of the standard deviation
e) Calculate the unbiased standard deviation.

Q-7 A resistance wire draws 38.8 V and 2.4 A. The uncertainties in the measurement are ± 0.4 V and ± 0.03 A respectively. Calculate the power dissipated in the resistance wire and uncertainty in the power.