



## Homework-1

Student Name: \_\_\_\_\_

Grade:  $\frac{\quad}{5}$

**1- A tensile specimen with a length of 4 cm subjected to a load of 80,000 N. It was extended to a length of 50 mm with a final diameter of 9.4 mm (under uniform deformation).**

- a- Find true stress ( $\sigma$ ) and true strain ( $\epsilon$ ).
- b- Determine the initial diameter ( $d_0$ ).
- c- Find the ductility as total elongation ( $\%RL$ ).



**2- A cylindrical specimen of *Aluminum 7075-O* with a diameter of 5.5 in and a length of 6 in was compressed to a length of 2 in.**

[Hint: look at **Table 1** for the values of K and n for *Aluminum 7075-O*]

- a- Determine the flow stress ( $Y_f$ ) and average flow stress ( $Y_{avg}$ ).
- b- Find the final diameter ( $d_1$ ).

**TABLE 2.3****Typical Values for  $K$  and  $n$  for Metals at Room Temperature**

	$K$ (MPa)	$n$
Aluminum		
1100-O	180	0.20
2024-T4	690	0.16
6061-O	205	0.20
6061-T6	410	0.05
7075-O	400	0.17
Brass		
70-30, annealed	900	0.49
85-15, cold-rolled	580	0.34
Cobalt-base alloy, heat-treated	2,070	0.50
Copper, annealed	315	0.54
Steel		
Low-C, annealed	530	0.26
4135, annealed	1,015	0.17
4135, cold-rolled	1,100	0.14
4340, annealed	640	0.15
304 stainless, annealed	1,275	0.45
410 stainless, annealed	960	0.10

**TABLE 1 | Typical Values for  $K$  and  $n$  for Metals at Room Temperature**