ASSIGNMENT #12

6.30 *A specimen of ductile cast iron having a rectangular cross section of dimensions 4.8 mm x 15.9mm (3/16 in. x 5/8 in.) is deformed in tension. Use the load–elongation characteristics shown in the following table to complete parts (a) through (f).*

Load		***Length***	
N	***lbf***	***mm***	***in.***
0	*0*	*75.000*	*2.953*
4,740	*1,065*	*75.025*	*2.954*
9,140	*2,055*	*75.050*	*2.955*
12,920	*2,900*	*75.075*	*2.956*
16,540	*3,720*	*75.113*	*2.957*
18,300	*4,110*	*75.150*	*3.959*
20,170	*4,530*	*75.225*	*2.962*
22,900	*5,145*	*75.375*	*2.968*
25,070	*5,635*	*75.525*	*2.973*
26,800	*6,025*	*75.750*	*2.982*
28,640	*6,440*	*76.500*	*3.012*
30,240	*6,800*	*78.000*	*3.071*
31,100	*7,000*	*79.500*	*3.130*
31,280	*7,030*	*81.000*	*3.189*
30,820	*6,930*	*82.500*	*3.248*
29,180	*6,560*	*84.000*	*3.307*
27,190	*6,110*	*85.500*	*3.366*
24,140	*5,430*	*87.000*	*3.425*
18,970	*4,265*	*88.725*	*3.493*
	Fracture		

(a) Plot the data as engineering stress versus engineering strain.

(b) Compute the modulus of elasticity.

(c) Determine the yield strength at a strain offset of 0.002.

(d) Determine the tensile strength of this alloy.

(e) Compute the modulus of resilience.

(f) What is the approximate ductility, in percent elongation?

6.42 *A tensile test is performed on a metal specimen, and it is found that a true plastic strain of 0.20 is produced when a true stress of 575 MPa (83,500 psi) is applied; for the same metal, the value of K in Equation 6.19 is 860 MPa (125,000 psi). Calculate the true strain that results from the application of a true stress of 600 MPa (87,000 psi).*

6.50 *A steel alloy specimen having a rectangular cross section of dimensions 12.7 mm × 6.4 mm (0.5 in. × 0.25 in.) has the stress–strain behavior shown in Figure 6.22. This specimen is subjected to a tensile force of 38,000 N (8,540 lb_f).*

(a) Determine the elastic and plastic strain values.

(b) If its original length is 460 mm (18.0 in.), what will be its final length after the load in part (a) is applied and then released?

6.51 *(a) A 10-mm-diameter Brinell hardness indenter produced an indentation 1.62 mm in diameter in a steel alloy when a load of 500 kg was used. Compute the HB of this material.*

(b) What will be the diameter of an indentation to yield a hardness of 450 HB when a 500-kg load is