Material Science
Homework 5
Due Tuesday Dec. 4, 2018

1. (1) What are the differences between brittle and ductile fracture?
   (2) What is the difference between intergranular and transgranular fracture?

2. (1) Give schematic drawings of cup-and-cone fracture.
   (2) What is dimples in fractographic?

3. (1) Describe the process and macroscopic character of fatigue fracture.
   (2) How to define the fatigue life of a metal?
   (3) Cite five factors that may lead to scatter in fatigue life data.

4. Briefly explain the difference between fatigue striations and beachmarks both in terms of (a) size and (b) origin.

5. (1) Draw a typical creep curve of strain versus time at constant load and constant elevated temperature. Mark all creep stages in your drawing.
   (2) Cite three metallurgical/processing techniques that are employed to enhance the creep resistance of metal alloys.

6. Some aircraft component is fabricated from an aluminum alloy that has a plane strain fracture toughness of 35 MPa $m^{1/2}$. It has been determined that fracture results at a stress of 251 MPa when the maximum (or critical) internal crack length is 2.2 mm. For this same component and alloy, will fracture occur at a stress level of 326 MPa when the maximum internal crack length is 1.2 mm? Why or why not?