

## Homework Assignment #5

assigned September 21

Reading Assignment  
Chapter 9 Sections 7 – 9

Problems Assignment - due date is  
Friday September 28

Instructions:

\* Neatness counts; lack of neatness counts negatively.

\* Start each problem solution on a new page.

### **Problem 5-1 [2 points]** <sup>[3,4]</sup>

For what wavelengths of light are metals transparent? (page 451)  
Calculate a quantitative answer.

### **Problem 5-2 [6 points; 2 2 2]** <sup>[3,4]</sup>

- (a) How do you know that AM radio waves reflect from the ionosphere?  
(b) From this, calculate a bound on the electron density in the ionosphere.  
(c) Explain, in one clearly written and legible paragraph, the **ionosonde**.

### **Problem 5-3 [4 points]** <sup>[3,4]</sup>

The density of matter in interstellar space is approximately one electron and one proton per cubic volume. What is the limit on the frequency of electromagnetic radiation that can propagate through such a medium without attenuation? Explain the result physically.

### **Problem 5-4 [2 points]** <sup>[5]</sup>

Exercise 9.7.1.

### **Problem 5-5 [4 points; 2 2]** <sup>[5]</sup>

Exercise 9.7.2.

### **Problem 5-6 [4 points; 2 2]** <sup>[5]</sup>

Exercise 9.7.5.

### **Problem 5-7 [8 points; 2 2 2 2]** <sup>[6]</sup>

Exercise 9.8.1.

**2 6 4 2 4 4 8 = 30**