

EE 483 Communications Systems I  
Homework Set 6

1. (20/100 - equally weighted parts) It is easy to demonstrate that amplitude modulation satisfies the superposition principle, whereas angle modulation does not. To be specific, let  $m_1(t)$  and  $m_2(t)$  be two message signals, and let  $u_1(t)$  and  $u_2(t)$  be the corresponding modulated versions.
  - a. Show that when the combined message signal  $m_1(t) + m_2(t)$  DSB modulates a carrier  $A_c \cos(2\pi f_c t)$ , the result is the sum of two DSB amplitude modulated signals  $u_1(t) + u_2(t)$ .
  - b. Show that if  $m_1(t) + m_2(t)$  frequency modulates a carrier, the modulated signal is not equal to  $u_1(t) + u_2(t)$ .
  
2. (25/100) Exercise 2.21 from your Textbook.
  
3. (30/100 = (20 (part a)+ 10 (part b))/100) Exercise 2.27 from your Textbook.
  
4. (25/100 = (15(part a)+ 10 (part b))/100)) Exercise 2.29 from your Textbook.