PROBLEM:

The signal x(t) is formed from the signal v(t) by AM modulation. Assume that

$$v(t) = 3 + 3\cos(5t + \pi/3)$$

and that

$$x(t) = v(t)\cos(20t).$$

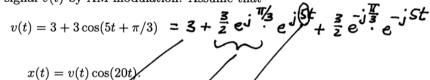
- (a) Draw the spectrum for v(t).
- (b) Draw the spectrum for x(t).

McClellan, Schafer and Yoder, Signal Processing First, ISBN 0-13-065562-7. Prentice Hall, Upper Saddle River, NJ 07458. © 2003 Pearson Education, Inc.



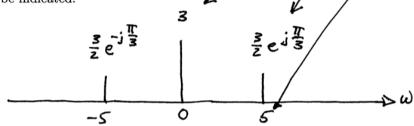


The signal x(t) is formed from the signal v(t) by AM modulation. Assume that



and that

(a) Draw the spectrum for v(t). Your sketch should be clearly labeled and all complex amplitudes should be indicated.



(b) Draw the spectrum for x(t). Your sketch should be clearly labeled and all complex amplitudes should be clearly indicated.

$$\chi(t) = \chi(t) \cos(20t)$$

$$= \left[3 + \frac{3}{2} e^{i \frac{\pi}{3}} \cdot e^{j St} + \frac{3}{2} e^{i \frac{\pi}{3}} \cdot e^{j St} \right] \cdot \frac{1}{2} \left[e^{j 20t} - j 20t \right]$$

$$= \frac{3}{2} e^{j 20t} + \frac{3}{4} e^{j \frac{\pi}{3}} \cdot e^{j 2St} + \frac{3}{4} e^{j \frac{\pi}{3}} \cdot e^{j 1St}$$

$$+ \frac{3}{2} e^{j 20t} + \frac{3}{4} e^{j \frac{\pi}{3}} e^{j 1St} + \frac{3}{4} e^{j \frac{\pi}{3}} e^{j 1St}$$

