EE470 HW 9

HW 9A: 3.9, 3.11, 3.22, 3.25
HW 9B: 3.21, 3.42
HW 9C: 3.31, 3.33, 3.45

Errata:
1. There are typographical errors in Problem 3.22. The waveforms are:

<table>
<thead>
<tr>
<th>(2 + cos 2 π f_m t) cos 2 π f_c t</th>
<th>(0.5 + cos 2 π f_m t) cos 2 π f_c t</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1 + cos 2 π f_m t) cos 2 π f_c t</td>
<td>(cos 2 π f_m t) cos 2 π f_c t</td>
</tr>
</tbody>
</table>

2. In problem 3.25 there should be an envelope detector before the square root device. (The envelope detector is present in some printings of the text, but not in others.)

3.9) Yes, the system will demodulate properly. This would be true for any periodic signal p(t).

3.11) \( \sigma^2 = (24^o)^2 = 576 \text{ degrees}^2 \)

3.22) b e
d c

3.25) \( y(t) = \frac{1}{\sqrt{2}} (1 + s_2(t)) \)

3.21) Envelope detection would recover the spectrum only if \( s(t) > 0 \) for all \( t \).

3.42) After low-pass filtering: \( \tilde{S}(f) = \frac{1}{4} S(f) \)

3.31) a) Matched filter detector. \( T_b = 10 \mu s, P_e = 0.05694 \)
b) Envelope detector, \( P_e = 0.1433 \)

3.33) \( R_b = 137.4 \text{ kbps} \)

3.45) \( \text{SNR}_o = 14.95 \text{ dB} \)