ECS 332: In-Class Exercise # 18 - Sol

Instructions

1. Separate into groups of no more than three students each. **The group cannot be the same as any of your former groups after the midterm.**
2. Write down all the steps that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do not panic.**

Date: 0 8 / 1 1 / 2019			
Name	ID (last 3 digits)		
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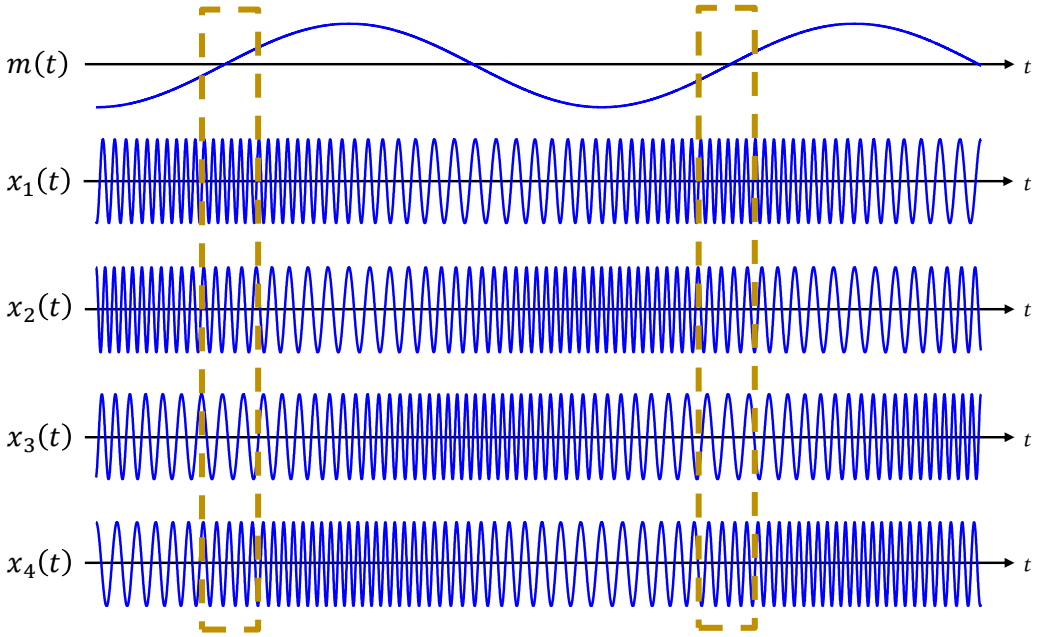
1. Consider a signal $x(t)=5\cos\left(8\pi t^3-12\pi t^2+26\pi t\right)$.
Let $f(t)$ be its instantaneous frequency. Find $f(1)$.

$$\theta(t) = 8\pi t^3 - 12\pi t^2 + 26\pi t$$
$$\frac{d}{dt}\theta(t) = 24\pi t^2 - 24\pi t + 26\pi$$
$$f(t) = \frac{1}{2\pi}\frac{d}{dt}\theta(t) = 12t^2 - 12t + 13$$
$$f(1) = 12 - 12 + 13 = 13.$$

2. [ENRPa] Consider five plots below. The top one is the baseband message signal $m(t)$ that is used in the modulation to create a PM signal. Identify which plot is $x_{\text{PM}}(t)$.



$x_{\text{PM}}(t)$: $x_1(t)$

The "frequency" of the PM signal should follow the value of $\frac{d}{dt}m(t)$.
For example, the time when $\frac{d}{dt}m(t)$ has highest value should correspond to the time when PM signal has the highest frequency.