Quiz 2 Solution

Suppose $x_{QAM}(t) = m_1(t)\sqrt{2}\cos(2\pi f_c t) + m_2(t)\sqrt{2}\sin(2\pi f_c t)$.

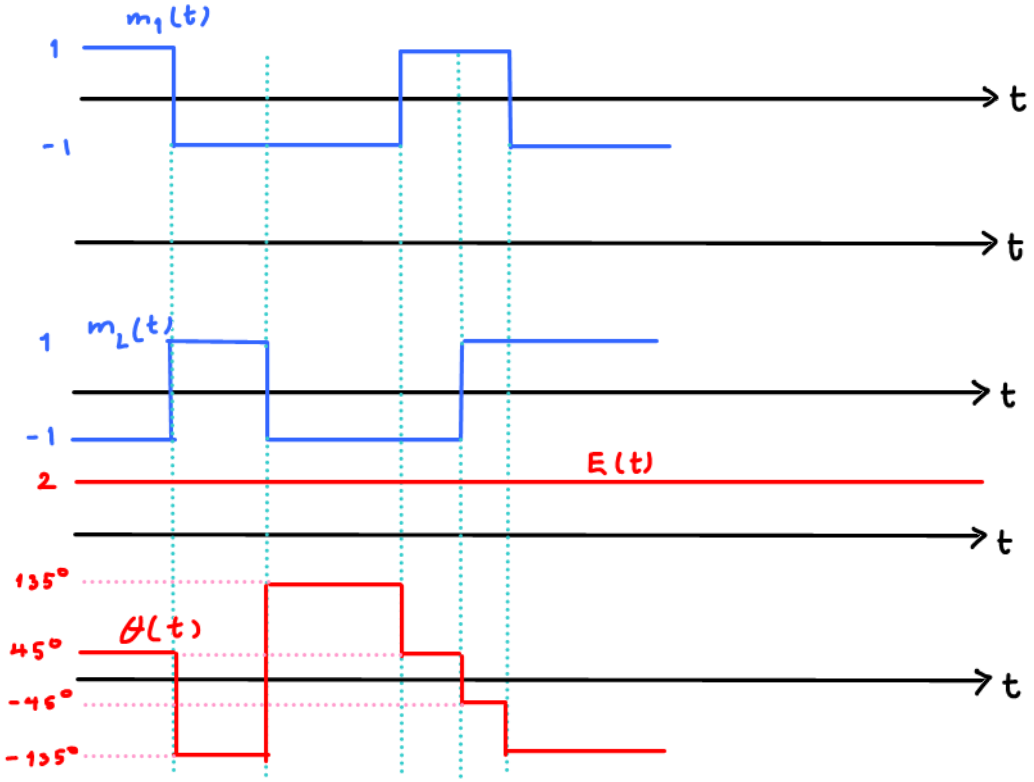
$m_1(t)$ and $m_2(t)$ are plotted below.

We want to express $x_{QAM}(t)$ in the form

$$x_{QAM}(t) = E(t)\cos(2\pi f_c t + \theta(t))$$

where $E(t) \geq 0$ and $\theta(t) \in (-180^\circ, 180^\circ]$.

Plot $E(t)$ and $\theta(t)$.



m_1	m_2	$m_1 - jm_2$	$\sqrt{2}(m_1 - jm_2)$
1	1	$1 - j = \sqrt{2}\angle -45^\circ$	$2\angle -45^\circ$
1	-1	$1 + j = \sqrt{2}\angle 45^\circ$	$2\angle 45^\circ$
-1	1	$-1 - j = \sqrt{2}\angle -135^\circ$	$2\angle -135^\circ$
-1	-1	$-1 + j = \sqrt{2}\angle 135^\circ$	$2\angle 135^\circ$

Quiz 2 Solution ← when $\sqrt{2}$ is factored out in the expression

Suppose $x_{QAM}(t) = m_1(t)\sqrt{2}\cos(2\pi f_c t) + m_2(t)\sqrt{2}\sin(2\pi f_c t)$.

$m_1(t)$ and $m_2(t)$ are plotted below.

We want to express $x_{QAM}(t)$ in the form

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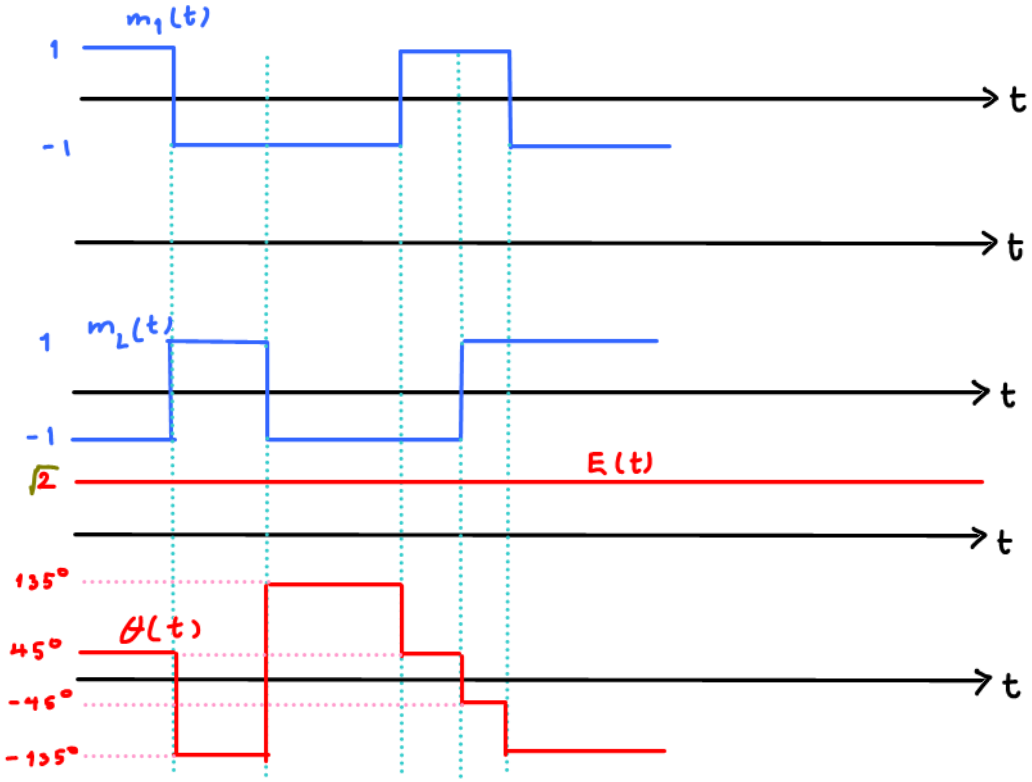
Plot $E(t)$ and $\theta(t)$.



m_1	m_2	$m_1 - jm_2$
1	1	$1 - j = \sqrt{2}\angle -45^\circ$
1	-1	$1 + j = \sqrt{2}\angle 45^\circ$
-1	1	$-1 - j = \sqrt{2}\angle -135^\circ$
-1	-1	$-1 + j = \sqrt{2}\angle 135^\circ$

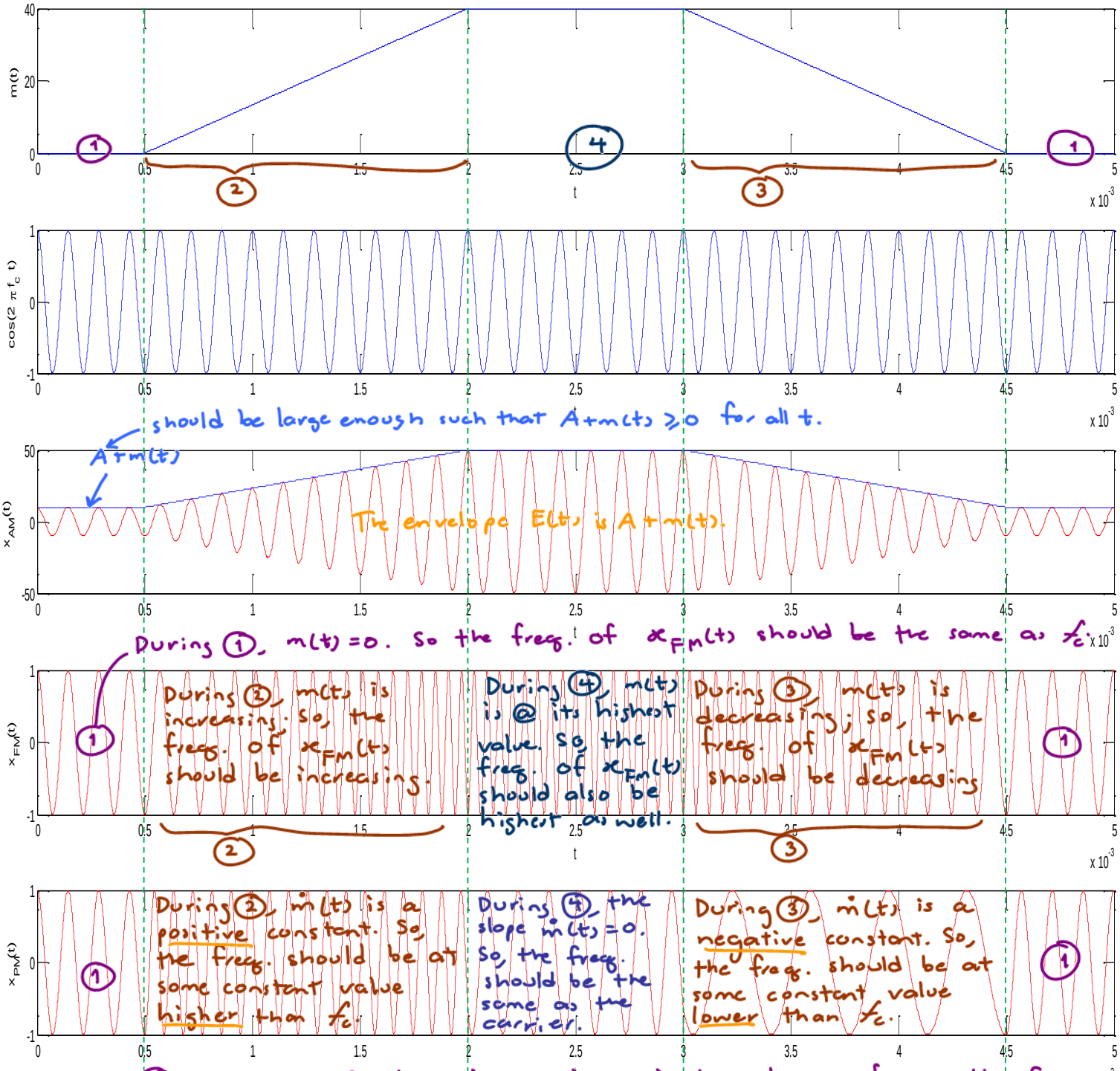
ECS 332: Quiz 3 Solution

Instructions

1. Separate into groups of no more than three persons.
2. The group cannot be the same as your former group.
3. Only one submission is needed for each group.
4. ***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.
5. **Do not panic.**

Name	ID
Prapun	

Consider the message m(t) plotted below. Sketch (one example for each type) the corresponding transmitted $x_{AM}(t)$, $x_{FM}(t)$, and $x_{PM}(t)$. Make sure that the important "features" can be seen clearly.



ECS 332: Quiz 4 Solution

Instructions

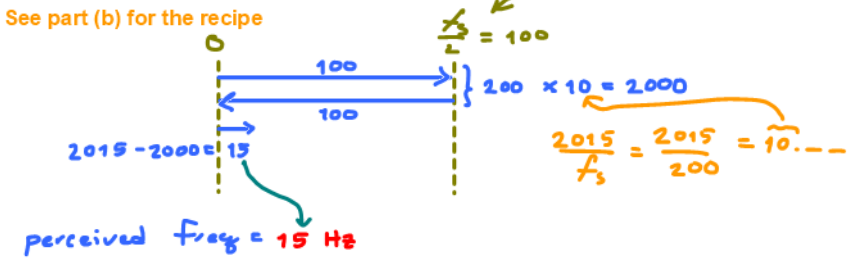
1. Separate into groups of no more than three persons.
2. The group cannot be the same as your former group.
3. Only one submission is needed for each group.
4. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without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

Name	ID
Prapun	**555**

1. Suppose we input $\cos(2\pi(XXXX)t)$ into `plotspect` with sampling rate f_s = 200 samples/sec. Find the perceived frequency (the freq. that `plotspect` sees) when

   a) XXXX = 2015

   See part (b) for the recipe



   b) XXXX = the last four digit of the ID of a person in your group

General recipe for $\cos(2\pi f_0 t)$:

To find the perceived freq., we will use the "folding technique":

i) Consider the window of freq. from 0 to $\frac{f_s}{2}$.

ii) Start from 0, increase the freq. to f_0

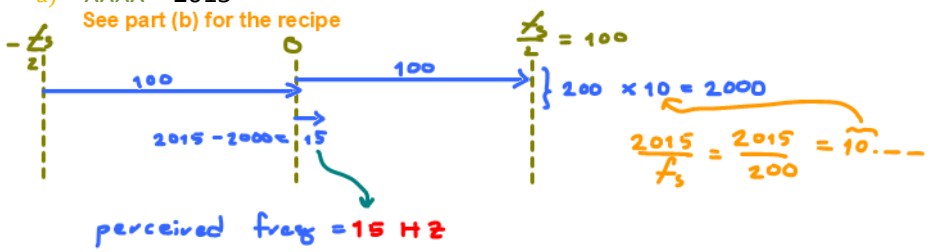
Fold back at 0 and $\frac{f_s}{2}$ if necessary.

See solutions of HW8 for the derivation

2. Suppose we input $e^{j(2\pi(XXXX)t)}$ into `plotspect` with sampling rate f_s = 200 samples/sec. Find the perceived frequency (the freq. that `plotspect` sees) when

   a) XXXX = 2015

   See part (b) for the recipe



   b) XXXX = the last four digit of the ID of a person in your group.

General recipe for $e^{j2\pi f_0 t}$.

To find the "perceived" frequency, we will use the "tunneling technique":

i) consider the window of freq. from $-\frac{f_s}{2}$ to $-\frac{f_s}{2}$.

ii) Start from 0.

If $f_0 > 0$, increase the freq. to f_0 (going to the right)

restart at $-\frac{f_s}{2}$ when $\frac{f_s}{2}$ is reached.

If $f_0 < 0$, decrease the freq. to f_0 (going to the left)

restart at $+\frac{f_s}{2}$ when $-\frac{f_s}{2}$ is reached.

This is the "tunneling" part.

See solutions of HW8 for the derivation