Quiz 2 Solution

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

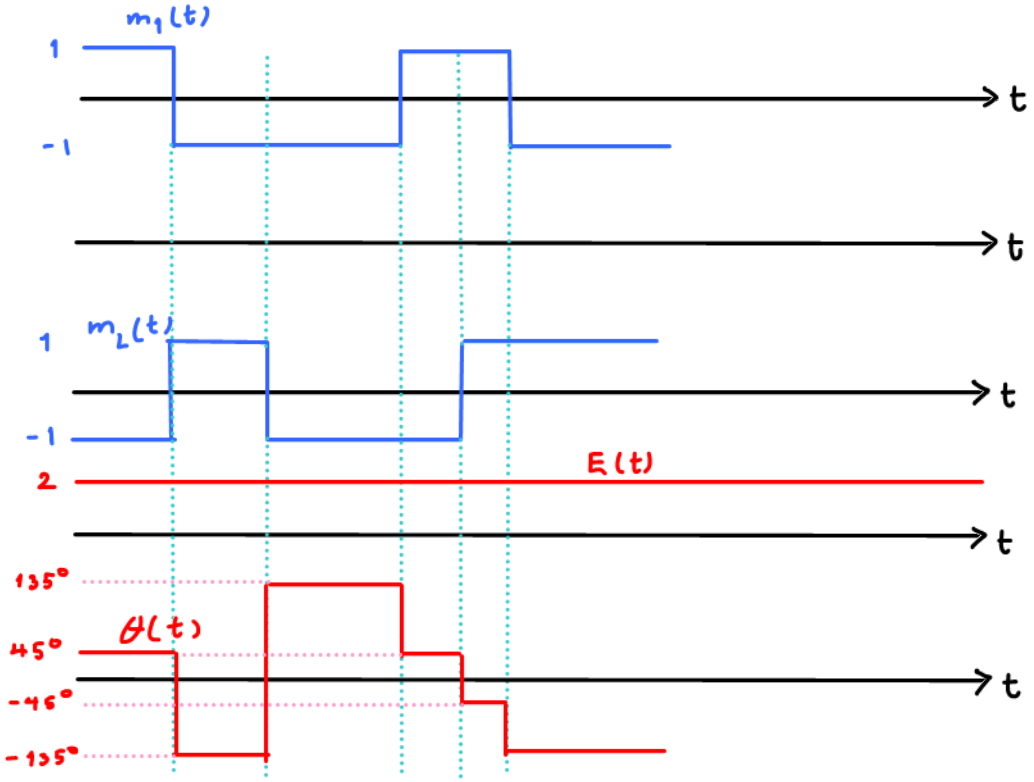
$m_1(t)$ and $m_2(t)$ are plotted below.

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

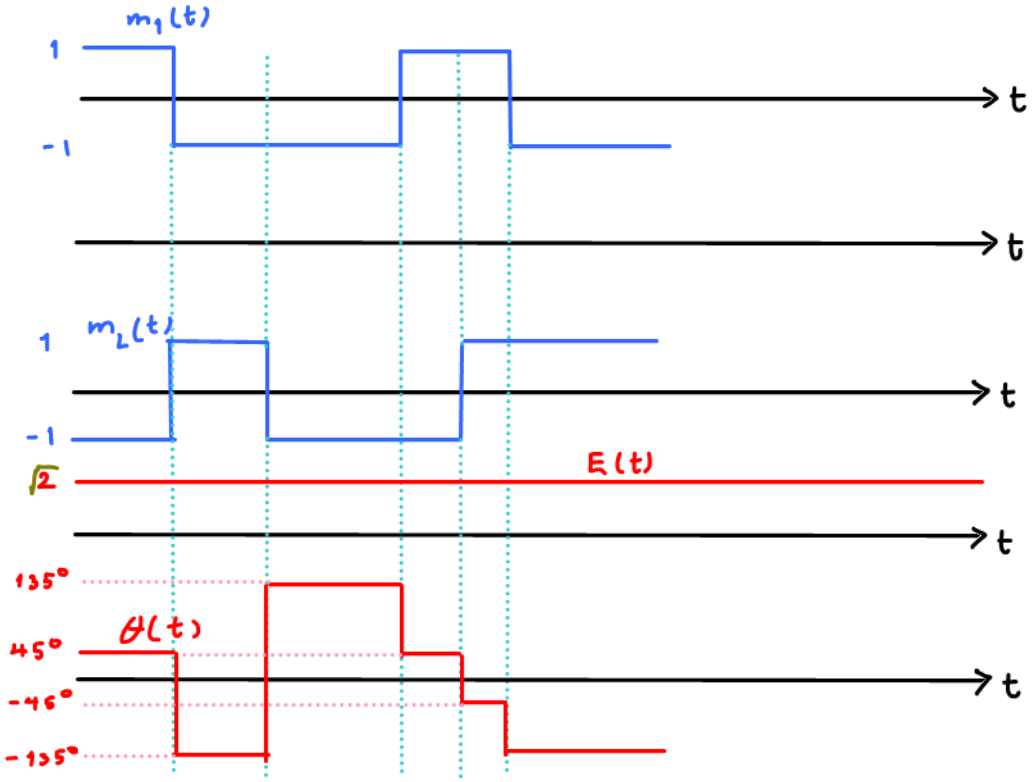
$m_1(t)$ and $m_2(t)$ are plotted below.

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

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

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

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



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