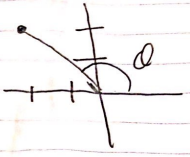
# Quiz 2

1 Find phase angle

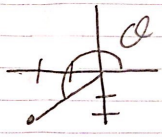
$z = -2 + 2j$




$\tan\theta = \frac{-2}{2}$

$\theta = 135^\circ$

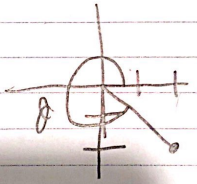
$z = -2 - 2j$




$\tan\theta = \frac{-2}{-2}$

$\theta = 225^\circ$

$z = 2 - 2j$




$\tan\theta = \frac{2}{-2}$

$\theta = 315^\circ$

2 $4\cos(2\pi(10.0)t + 30^\circ) = v(t)$

when $t = 0$

$4\cos(30)$

$4 \angle 30$

$2\sin(2\pi(10.0)t - 60^\circ) = v(t)$

when $t = 0$

$2\sin(2\pi(10)t - 60)$

$= 2\cos(2\pi(10)t - 60 - 90)$

$= 2\cos(2\pi(10)t - 150)$

$= 2\cos(-150)$

$2 \angle -150$

3 $f(x) = \begin{cases} 1, & 0 \le x < \pi \\ 0, & \pi < x \le 2\pi \end{cases}$

by def $F\{f(x)\} = \frac{1}{\sqrt{2\pi}} \int_0^{2\pi} f(x) e^{-i\omega x} dx$

$= \frac{1}{\sqrt{2\pi}} \left[ \int_0^{\pi} 1 \, e^{-i\omega x} dx + \int_{\pi}^{2\pi} 0 \, e^{-i\omega x} dx \right]$

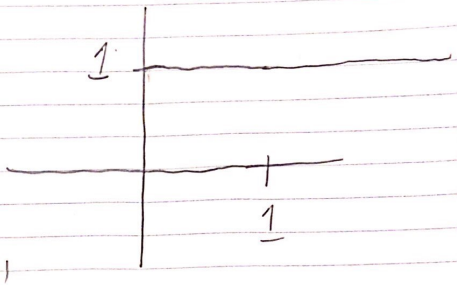
$= \frac{1}{\sqrt{2\pi}} \left[ \frac{e^{-i\omega x}}{-i\omega} \Big|_0^{\pi} \right]$

$= \frac{1}{\sqrt{2\pi}} \left[ \frac{e^{-i\omega(0)}}{-i\omega} - \frac{e^{-i\omega(\pi)}}{-i\omega} \right]$

$= \frac{1}{\sqrt{2\pi}} \left[ \frac{1 - e^{-i\omega\pi}}{-i\omega} \right]$

The magnitude of the Fourier transform is equal to 0 from (0 to $2\pi$)

4 $f(x) = 1$




$$\int_0^1 1 \, dx = x\Big|_0^1 = 1 - 0 = 1 \text{ everywhere}$$

The statistical mean would be equal to 1

Standard deviation

$$\sigma = \sqrt{\frac{(b-a)^2}{12}} = \sqrt{\frac{1}{12}}$$

$$= \frac{1}{\sqrt{12}}$$

$$= \boxed{\frac{\sqrt{12}}{12}}$$