Part D

$\tan^2 x = 2 \cdot \tan x - \sin x$

$1 = 2 \cdot \frac{\sin x}{\cos x} - \sin x \frac{\cos^2 x}{\sin^2 x}$

$1 = 2\cos x$

$\cos x = \frac{1}{2}$

$x = 60^\circ, 300^\circ$

* $\sin^2 x = 0$

$\sin x = 0$

$x = 0^\circ, 360^\circ, 180^\circ$

for $0^\circ \le \alpha \le 360^\circ$

$0^\circ \le \beta \le 360^\circ$

4 $\tan(\alpha+\beta) = \tan(\alpha) + \tan(\beta)$

$\frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} = \tan(\alpha) + \tan(\beta)$

When does $\tan\alpha + \tan\beta = 0$?

α	β
45°	135°
45°	315°
~~135°~~	~~45°~~
135°	225°
~~225°~~	~~135°~~
225°	315°
~~315°~~	~~45°~~
~~315°~~	~~225°~~

When does $\tan\alpha\tan\beta = 0$?

α : $0^\circ, 180^\circ, 360^\circ$ ↔ vice versa

β : any, but not $90^\circ, 270^\circ$ ← b/c undefined

Any values if $\alpha + \beta = 0, 180^\circ, 360^\circ$, as long as α or $\beta \neq \frac{\pi}{2}, \frac{3\pi}{2}$, b/c undefined

5 $x^6 - 1 = 0$

$\therefore a^2 - b^2 = (a+b)(a-b)$

$\therefore (x^3)^2 - (1)^2 = 0$

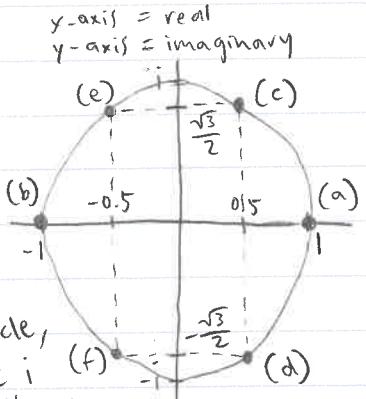
$\therefore (x^3+1)(x^3-1)$

$\therefore a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$

$\therefore (x+1)(x^2 - x + 1)(x-1)(x^2+x+1)$

$x = \frac{1 \pm \sqrt{1-4(1)(1)}}{2} = \frac{1 \pm \sqrt{1-4}}{2} = \frac{1 \pm \sqrt{-3}}{2} = \frac{1 \pm i\sqrt{3}}{2} = \frac{1}{2} \pm i\frac{\sqrt{3}}{2}$

$x = \frac{-1 \pm \sqrt{1-4(1)(1)}}{2} = -\frac{1}{2} + \frac{i\sqrt{3}}{2}$



(a)	(b)	(c)	(d)	(e)	(f)
$x = 1$	-1	$\frac{1+i\sqrt{3}}{2}$	$\frac{1-i\sqrt{3}}{2}$	$\frac{-1+i\sqrt{3}}{2}$	$\frac{-1-i\sqrt{3}}{2}$
↓	↓	↓	↓	↓	↓
0	π	$\frac{\pi}{3}$	$\frac{5\pi}{3}$	$\frac{2\pi}{3}$	$\frac{4\pi}{3}$

These are all points on the complex plane, which is like the unit circle, b/c i is the same length as 1

$\tan(\alpha-\beta) = \tan(\alpha) - \tan(\beta)$

$\frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta} = \tan(\alpha) - \tan(\beta)$

When does $\tan\alpha - \tan\beta = 0$?

When does $\tan\alpha\tan\beta = 0$?

α : $0^\circ, 180^\circ, 360^\circ$

β : any, but not $90^\circ, 270^\circ$ b/c undefined

α	β
45°	225°
45°	45°
135°	135°
135°	315°
30°	30°
30°	210°

Any values if $\alpha = \beta$, or when $\alpha + 180^\circ = \beta$ as long as α or $\beta \neq \frac{\pi}{2}, \frac{3\pi}{2}$, b/c undefined