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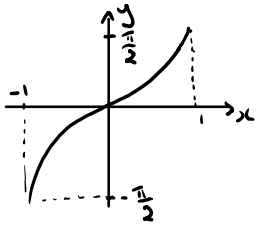
Thank you for using BF Maths for your maths revision!

6.5 - Inverse Trigonometric Functions

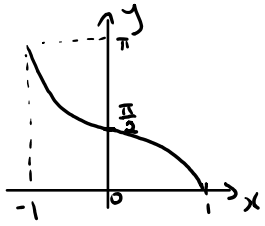
1a) $f(x) = \arcsin x$



Domain: $-1 \leq x \leq 1$

Range: $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

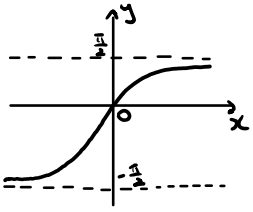
1b) $f(x) = \arccos x$



Domain: $-1 \leq x \leq 1$

Range: $0 \leq y \leq \pi$

1c) $y = \arctan x$



Domain: $x \in \mathbb{R}$

Range: $-\frac{\pi}{2} < y < \frac{\pi}{2}$

2a) $\arctan(1) = \frac{\pi}{4}$

$(\because \tan\frac{\pi}{4} = 1)$

2b) $\arcsin(-\frac{\sqrt{3}}{2}) = -\frac{\pi}{3}$

$(\because \sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$

$\therefore \sin(-\frac{\pi}{3}) = -\frac{\sqrt{3}}{2})$

2c) $\arccos(\frac{1}{2}) = \frac{\pi}{3}$

$(\because \cos\frac{\pi}{3} = \frac{1}{2})$

3a) $\arcsin(\sin\frac{\pi}{2})$

$= \arcsin(\sin\frac{\pi}{2})$

$= \frac{\pi}{2}$

3b) $\arccos(\cos 3\pi)$

$= \arccos(-1)$

$= \pi$

3c) $\arctan(\tan\frac{5\pi}{4})$

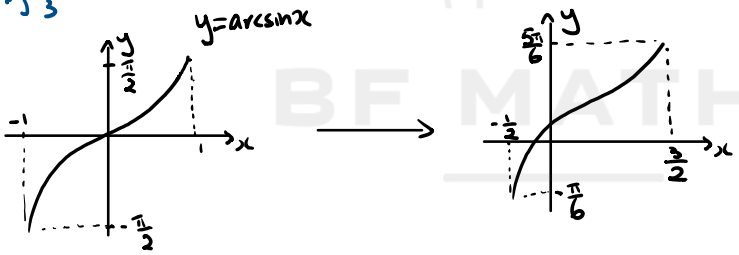
$= \arctan(1)$

$= \frac{\pi}{4}$

4a) $y = \frac{\pi}{3} + \arcsin(x - \frac{1}{2})$

move up by $\frac{\pi}{3}$

move right by $\frac{1}{2}$



4b) $y = \frac{\pi}{3} + \arcsin(x - \frac{1}{2})$

When $y = 0$ (Crosses the x-axis)

$0 = \frac{\pi}{3} + \arcsin(x - \frac{1}{2})$

$-\frac{\pi}{3} = \arcsin(x - \frac{1}{2})$

$\sin(-\frac{\pi}{3}) = x - \frac{1}{2}$

$-\frac{\sqrt{3}}{2} = x - \frac{1}{2}$

$x = -\frac{\sqrt{3}}{2} + \frac{1}{2} = \frac{1-\sqrt{3}}{2}$

$(\frac{1-\sqrt{3}}{2}, 0)$

If you need help on this chapter:
[A-Level Maths | Pure Year 2 | 6.5 - Inverse trigonometric identities Walkthrough | Edexcel]

6.5 - Inverse Trigonometric Functions

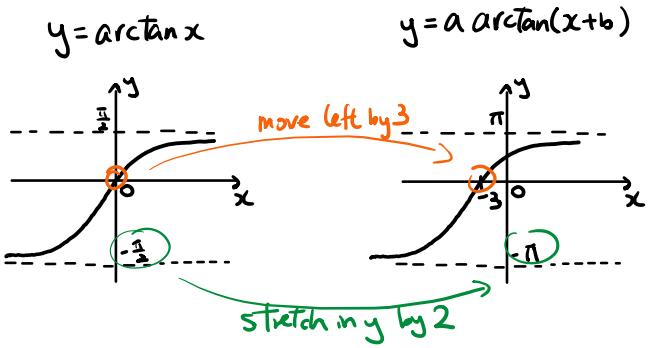
5) $\arccos\left(\frac{\sqrt{3}}{2}\right) + \arccos\left(-\frac{1}{2}\right)$

$= \frac{\pi}{6} + \frac{2\pi}{3}$

$= \frac{5\pi}{6}$

6a) $y = a\arctan(x+b)$

stretch in y — translation horizontally



$\therefore a = 2, \; b = 3$

$y = 2\arctan(x+3)$

6b) When $x = 0$ (crosses the x-axis)

$y = 2\arctan(0+3)$

$y = 2\arctan 3 = 2.498 \Rightarrow (0, 2.498)$

7) $\arccos(x-3) = \frac{\pi}{4}$ ⇝ $\cos^{-1}(x-3) = \frac{\pi}{4}$

$x - 3 = \cos\left(\frac{\pi}{4}\right)$

$x - 3 = \frac{\sqrt{2}}{2}$

$x = \frac{6+\sqrt{2}}{2}$