

Pure 4 – Inverse Functions, sec, cosec and cot

Please **complete** this homework by _____. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

Section 1 – Review of previous topics. Please complete all questions.

- Solve for x , $0 \leq x \leq 360^\circ$, giving your answers to 3 s. f.
 - $\cos x = 0.9$
 - $\sin x = 0.41$
 - $\tan x = 0.74$
- Solve for x , $0^\circ \leq x \leq 360^\circ$.
 - $\sin(x - 10^\circ) = 0.5$
 - $\cos 2x = 0.5$
- Solve each equation for x , $-180^\circ \leq x \leq 180^\circ$, giving your answers to 1 decimal place where appropriate
 - $2\tan(x-15) = 3.7$
 - $4\cos 3x = 2$
 - $\tan(2x+30) = -1$
- Solve each equation for x in the interval $0^\circ \leq x \leq 360^\circ$. Give your answers to 1 decimal place where appropriate
 - $2\cos^2 x + \cos x = 0$
 - $\tan^2 x + 3\tan x - 1 = 0$
- Write down the identity which links $\sin^2 x$ and $\cos^2 x$
 - Write down the identity which links $\sin x$, $\cos x$ and $\tan x$
- Solve each equation for x in the interval $0^\circ \leq x \leq 360^\circ$. Give your answers to 1 decimal place where appropriate
 - $\cos x = 3\tan x$
 - $2\sin^2 x + 3\cos x = 3$
 - $3\sin x \tan x = 8$

Section 2 – Consolidation of this week's topic. Please complete all questions.

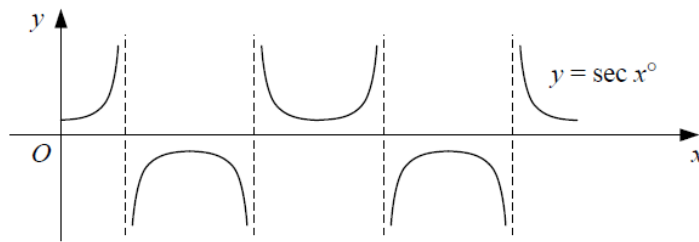
- $$f(x) = \sin x, x \in R, -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$$
 - State the range of f . **(1 mark)**
 - Define the inverse $f^{-1}(x)$ and state its domain. **(2 marks)**
 - Sketch on the same diagram the graphs of $f(x)$ and $f^{-1}(x)$ **(4 marks)**
- Solve each equation, giving your answers to 3 significant figures.
 - $\arccos x = 2$
 - $\arctan 3x = 0.96$
 - $3 - \arccos 2x = 0$ **(6 marks)**
- $$f(x) = \arccos x - \frac{\pi}{3}, x \in R, -1 \leq x \leq 1$$
 - State the value of $f\left(-\frac{1}{2}\right)$ in terms of π . **(1 mark)**
 - Solve the equation $f(x) = 0$. **(2 marks)**
 - Define the inverse function $f^{-1}(x)$ and state its domain. **(4 marks)**
 - Sketch on the same diagram the graphs of $f(x)$ and $f^{-1}(x)$ **(4 marks)**
- Find to 2 decimal places the value of
 - $\sec 23^\circ$
 - $\operatorname{cosec} 185^\circ$
 - $\cot 259^\circ$ **(1 mark each)**

5. Find the value of

a) $\operatorname{cosec} \frac{\pi}{4}$ b) $\cot \frac{3\pi}{4}$ c) $\sec \frac{4\pi}{3}$

(1 mark each)

6.



(4 marks)

The graph shows the curve $y = \sec x^\circ$ in the interval $0 \leq x \leq 720$.

- a Write down the coordinates of the turning points of the curve.
b Write down the equations of the asymptotes.

7. Sketch each of the following curves for x in the interval $0 \leq x \leq 2\pi$. Show the coordinates of any turning points and the equations of any asymptotes.

a $y = 3 \sec x$

b $y = 1 + \operatorname{cosec} x$

c $y = \cot 2x$

(9 marks)

8. Solve each equation for x in the interval $0 \leq \theta \leq 2\pi$, giving answers to 3 significant figures where appropriate

a) $\sec \theta = 1.8$

(2 marks)

b) $\operatorname{cosec} \left(\theta + \frac{\pi}{6} \right) = 2$

(4 marks)

c) $\operatorname{cosec}^2 \theta - 4 = 0$

(4 marks)

d) $\sec^2 \theta - 2 \sec \theta - 3 = 0$

(4 marks)

9. Prove the following identities:

a) $\sec x - \cos x \equiv \sin x \tan x$

(4 marks)

b) $((1 + \cos x)(\operatorname{cosec} x - \cot x) \equiv \sin x$

(4 marks)

Total 65 marks