

Problem Sheet 2

Deadline: **Monday 17 October, 5:00.**

Hand in to **the drop box** in the undergraduate common room (maths department, room 502).

Hand in the questions marked with an asterisk (*).

One mark will be deducted if you do not **staple your work**.

1) Without a calculator, find the value of $\tan \theta$ when:

* a) $\cot \theta = \frac{1}{2}$

b) $\theta = \frac{\pi^c}{4}$

* c) $\sec \theta = 4$ and $\tan \theta$ is positive

* d) $\cos \theta = \frac{3}{5}$ and $\sin \theta$ is negative

e) $\sin \theta = \frac{1}{2}$ and $\cos \theta$ is positive

2) Write each of the following in the form 2^r , where $r \in \mathbb{R}$:

* a) $\sqrt{2}$

* d) $3 \times 2^4 - 2^4$

b) $2^5 \times 4^2$

e) $2^5 - 2^4$

* c) $\sin \frac{\pi}{4}$

* f) 1

* 3) Find all solutions to $(x^2 - 9x + 9)^{(x^2+x-6)} = 1$.

4) Using $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to find $f'(x)$ for each of the following:

a) $f(x) = 1$

b) $f(x) = x$

* c) $f(x) = g(x) + h(x)$ [Give your answer in terms of $g(x)$, $g'(x)$, $h(x)$ and $h'(x)$]

* d) $f(x) = x^2$

Challenge) $f(x) = \sin x$ [When h is small, you may assume $\sin h \approx h$ and $\cos h \approx 1 - h^2$]