Problem Sheet 2

Deadline: **Monday 19 October, 5:00**.
Hand in to **drop box 5** 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) Show that:

* a) $\sin(\theta - \phi) = \sin\theta\cos\phi - \cos\theta\sin\phi$

  b) $\cos(\theta - \phi) = \cos\theta\cos\phi + \sin\theta\sin\phi$

2) Find the value of $\tan\theta$ when:

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

  b) $\theta = \pi^{\mathrm{c}}$

* c) $\sec\theta = 100$ and $\tan\theta$ is negative

  d) $\sin\theta = 0$

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

* f) $\sin\theta = -\frac{1}{\sqrt{5}}$ and $\cos\theta$ is negative

3) Using
$$f'(x) = \lim_{h\to 0}\frac{f(x+h) - f(x)}{h},$$
find $f'(x)$ when:

  a) $f(x) = x$

  b) $f(x) = x + 2$

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

  d) $f(x) = 3x^2$

* e) $f(x) = \frac{1}{x+2}$

  f) **Challenge**: $f(x) = \sin x$
     [Hint: When h is small $\sin h \approx h$ and $\cos h \approx 1$.]