

MA1200 Hand-in Assignment #1 due Sep. 18

Instructions to students:

1. Please submit it via Canvas in a PDF file (you can handwrite the answers and take photos by your phone, then make it into a PDF file, see, for example, <https://www.wikihow.com/Convert-JPG-to-PDF> for how to combine JPG files to a PDF; you can also do it by note-taking apps on an iPad or a Surface)
2. The assignment is due on **23:59 of September 18 (Sunday)**. Late submissions will **NOT** be marked.
3. Please write down your name and student ID.

Questions:

1. Find the line through $(3, 5)$ which is perpendicular to the line L with equation $3x - 2y = 1$.
2. The straight line $4x + 3y = 6$ meets the x -axis at the point P and the y -axis at the point Q . Find the equation of the perpendicular bisector of PQ .
3. Find the equation of the circle which passes through the points $(2, 2)$, $(-1, -1)$ and $(2 + 2\sqrt{2}, 0)$.
4. Classify the following conic sections. Find its center, vertices, foci, directrix (if possible), asymptotes (if possible). Then, sketch its graph.
 - (a) $25x^2 + y^2 + 50x - 4y + 4 = 0$.
 - (b) $y^2 - 8x + 2y + 41 = 0$.
 - (c) $-9x^2 + 4y^2 + 18x + 16y - 29 = 0$.
5. Find the largest possible domain and the corresponding range of the following functions:

$$(i) \quad f(x) = \sqrt{(x-1)(2x+3)}, \quad (ii) \quad g(x) = \sqrt{-x^2 - 2x}.$$

6. Let $F(x) = \frac{1}{1-x}$ and $G(x) = 1 - \frac{1}{x}$.

- (a) Find their largest possible domains and ranges.
 - (b) Find $(F \circ G)(x)$ and states its largest possible domain.
7. Let $f(x)$ be a periodic function of x with period 2 and $f(x) = |x| + x$ for $-1 < x \leq 1$. Sketch the graph of the curve $y = f(x)$ in the interval $[-3, 3]$.

8. Let $f(x) = (x - [x])^2, x \in \mathbb{R}$, where $[x]$ is the greatest integer not greater than x .
- (a) Sketch the graph of $y = f(x)$ for $-3 \leq x \leq 3$.
 - (b) Find the range of $f(x)$.
 - (c) Is $f(x)$ a periodic function of x ? If yes, find the period. If not, state your reason.
9. The function $F(x) = (x + 2)^2 - 3$ for $x \in (-\infty, -2]$ is one-to-one. Find its inverse function. State the domain and range of F^{-1} clearly.

End