MS115 Mathematics for Enterprise Computing

Tutorial Sheet 5

1. Determine the inverses of the following functions:

   (i) $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = 2x + 2$

   (ii) $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = -3x + 4$

   (iii) $f : \mathbb{R} - \{\frac{1}{3}\} \to \mathbb{R} - \{\frac{2}{3}\}$ defined by $f(x) = \frac{2x+2}{3x-1}$

   (iv) $f : \mathbb{R} - \{\frac{1}{2}\} \to \mathbb{R} - \{\frac{1}{2}\}$ defined by $f(x) = \frac{x+4}{-2x+1}$

2. Consider
$$f(x) = \frac{x-1}{x+5}$$

   (i) What is the largest domain on which f is defined?

   (ii) Considering f as a function on this domain, what is the range of f?
   Hint: For what value(s) of $a \in \mathbb{R}$ does $\frac{x-1}{x+5} = a$ not have a solution?

   (iii) Considering f as a function from its natural domain to its range, determine the inverse of f.

3. Consider the line with equation $2x + y = 10$.

   (i) Determine the slope and y-intercept of the line.

   (ii) Identify two points that lie on the line.

   (iii) Sketch the line in the region where $x \geq 0$ and $y \geq 0$.

   (iv) Determine the x-intercept of the line,
   i.e. the point at which the line crosses the x-axis.

4. Determine the point of intersection of the following pairs of straight lines:

   (i) $y = x + 2$ and $y = 3x$

   (ii) $2y = x + 2$ and $y = -2x + 7$