Problem Sheet 1

MS135 IT Mathematics II

Exercise 1.

Find the equations that determine the following lines:

(a) The line through $(-1, 5)$ with slope -2.

(b) The line through $(-1, -2)$ and $(1, 3)$.

(c) The line through $(0, 5)$ which is parallel to the line $y = 7 - 3x$.

(d) The line through $(1, 1)$ which is perpendicular to the line $y = 2x - 5$. (Hint: the product of the slopes of two perpendicular straight lines is -1.)

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Exercise 2.

Draw or sketch the graphs of the following functions. (Hint: It often helps to first make a short table with well chosen values of x and $f(x)$.)

(a) $f(x) = (x - 2)^2 - 1$,

(b) g, the straight line through the points $(0, 2)$ and $(3, -2)$,

(c) $\sin(x)$.

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Exercise 3.

Find the polynomial $p(x)$ in each of the following cases. (Hint: determine $p(x)$ by starting at the highest power of x.)

(a) $x^2 - 3x = x \cdot p(x)$,

(b) $2x - 3 = 2 \cdot p(x)$,

(c) $x^2 + 4x - 5 = (x - 1) \cdot p(x)$,

(d) $x^3 + 4x^2 - 8 = (x + 2) \cdot p(x)$,

(e) $x^8 - 1 = (x - 1) \cdot p(x)$,

(f) $x^4 - 2x^2 + 1 = (x^2 - 2x + 1) \cdot p(x)$.

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Exercise 4.

Find the roots of the following functions and determine where the functions are positive.

(a) $f(x) = 49 - x^2$,

(b) $f(x) = x^2 - 5x - 6$,

(c) $g(y) = y^2 - 4y + 4$,

(d) $h(t) = t^2 + 2t + 3$,

(e) $g(x) = -x^2 + 3x - 2$,

(f) $h(x) = x^4 + 4x^2 + 3$.

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