Increasing/ decreasing function

Increasing function: $f'(x) > 0$
Decreasing function: $f'(x) < 0$

Find the intervals where the following functions are increasing or decreasing.

1. $f(x) = x^2 - 2x + 1$

2. $f(x) = -x^2$

Find the intervals where the following functions are increasing or decreasing **using GDC**.

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

2. $f(x) = e^{x^2}$

Turning points

Maximum / Minimum point
$f'(x) = 0$
Horizontal tangent line

1. The function $f(x) = 3x^2 - 6$ has a minimum point at A. Find the coordinates of A.

2. $f(x) = x^3 + kx + p$ has a turning point at (– 2, 3).
Find the values of k and p.

Paper 1

1. Consider $f(x) = x^2 + \frac{p}{x}$, $x \neq 0$, where p is a constant.

(a) Find $f'(x)$.

(b) There is a minimum value of $f(x)$ when $x = -2$. Find the value of p.

2. Let $g(x) = \frac{lnx}{x^2}$, for $x > 0$.

(a) Use the quotient rule to show that $g'(x) = \frac{1-2lnx}{x^3}$.

(b) The graph of g has a maximum point at A. Find the x-coordinate of A.

Paper 2

1. (calculator) Let $f'(x) = -24x^3 + 9x^2 + 3x + 1$.

(a) There are two points of inflexion on the graph of f. Write down the x-coordinates of these points.

(b) Let $g(x) = f''(x)$. Explain why the graph of g has no points of inflexion.

2. (calculator) Let $f(x) = \frac{20x}{e^{0.3x}}$, for $0 \leq x \leq 20$.

(a) Sketch the graph of f.

(b) (i) Write down the x-coordinate of the maximum point on the graph of f.

(ii) Write down the interval where f is increasing.

(c) Show that $f'(x) = \frac{20-6x}{e^{0.3x}}$.

(d) Find the interval where the rate of change of f is increasing.