Advanced Higher Unit 1 **Homework Exercise Outcome 4**

1. (a) For the following functions, write down suitable domains and their corresponding ranges.

(b) Find also the inverse of each function, again stating a suitable domain and range for each.

(i) $f(x)=\dfrac{3}{(x+1)^2}$ (ii) $f(x)=\sqrt{2x-1}$

2. The function $f(x)=1+\sin 2x$ is defined such that it has an inverse.

(a) Sketch $y=f(x)$, and the inverse function $y=f^{-1}(x)$ on separate diagrams.

(b) State suitable domains and ranges for both functions.

(c) Find a formula for $f^{-1}(x)$, the inverse of $f(x)=1+\sin 2x$.

3. A function $f(x)=\dfrac{x^3+x}{x^2}$ is defined on $[-3,3]$.

(a) Identify all local extrema and determine their nature.

(b) Identify any global maxima and minima if different from (a).

4. Repeat question **3.** for $f(x)=|x^2+x-6|$, defined on the domain [-4, 2).

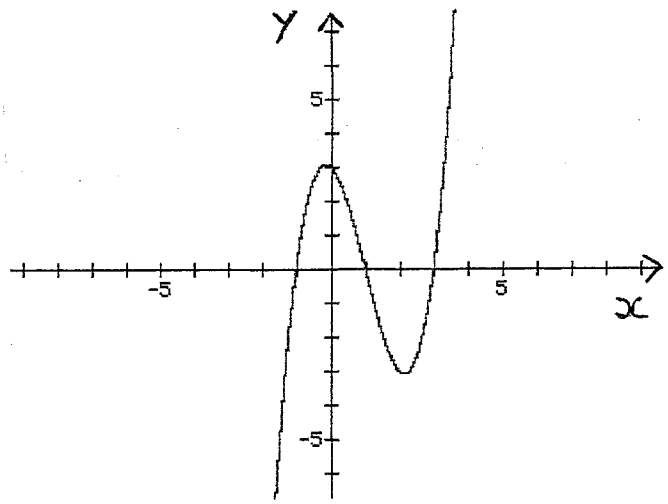
5. The graph of $y=f(x)$ is shown.
Sketch the graphs of the following related functions.

(a) $y=3f(x)$ (b) $y=2-f(x)$

(c) $y=f(4-x)$ (d) $y=|f(x)|$

(e) $y=2f(-2x+1)-3$

(f) $y=f^{-1}(x)$.



6. Determine whether the following functions are odd, even or neither.
State what significance this has for the graph of each function.

(a) $f(x) = x + 2\sin x$

(b) $f(x) = 3x^2 - 3 + \frac{4}{x^4}$

(c) $f(x) = 2x^3 - 3x^2 + x$

(d) $f(x) = \frac{2}{x^3} - \frac{4}{x}$

7. Sketch graphs of the following functions. Make sure you show all the necessary justification for asymptotes, stationary points, etc.

(a) $y = \frac{2x+5}{x-3}$

(b) $y = \frac{x^2}{x^2+x-2}$

(c) $y = \frac{x^2-4x+1}{x-4}$