Q 1. *Find the domain of the given function*

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

Q 2. *Find the domain and range of the given functions*

a) $f(x) = x^2 - 2x - 3$

b) $f(x) = \dfrac{1}{|x+1|}$

c) $f(s) = \dfrac{1}{1 - \sqrt{s-2}}$

d) $f(t) = \dfrac{t^2+1}{t^2-4}$

Q 3. *Find the domain and range of the given piecewise defined function*

$$f(x) = \begin{cases} \dfrac{1}{x-2} & \text{if } x < 0 \\[2mm] \sqrt{x} & \text{if } 0 \leq x \leq 4 \\[2mm] |x-6| & \text{if } x > 4 \end{cases}$$

Q 4. *Use the even/odd function definition to determine whether the following functions are even, odd or neither*

a) $f(x) = x^2 + x$

b) $f(x) = \dfrac{1}{x^2-1}$

c) $f(t) = 2|t| + 1$

d) $f(s) = \dfrac{1}{e^s - e^{-s}}$

Q 5. *Show that*

a) $f(x) = \dfrac{1}{x}$ *is decreasing on* $(0, \infty)$ *interval,*

b) $f(x) = \sqrt{x}$ *is increasing on* $[0, \infty)$ *interval,*
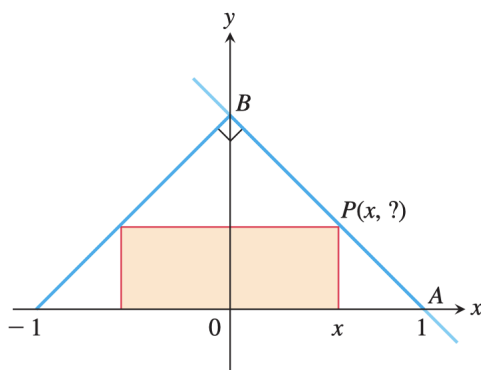
c) $f(x) = x^3 + 2$ *is decreasing on* $(-\infty, \infty)$ *interval,*

Q 6. *Sketch the graph of the function $f(x) = |x| + |x + 1|$.*

Q 7. *The accompanying figure shows a rectangle inscribed in an isosceles right triangle whose hypotenuse is 2 units long.*

    a) *Express the y-coordinate of P in terms of x. (You might start by writing an equation for the line AB.)*

    b) *Express the area of the rectangle in terms of x.*

Q 8. *A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 14 cm by 22 cm by cutting out equal squares of side x at each corner and then folding up the sides as in the figure. Express the volume V of the box as a function of x.*

2