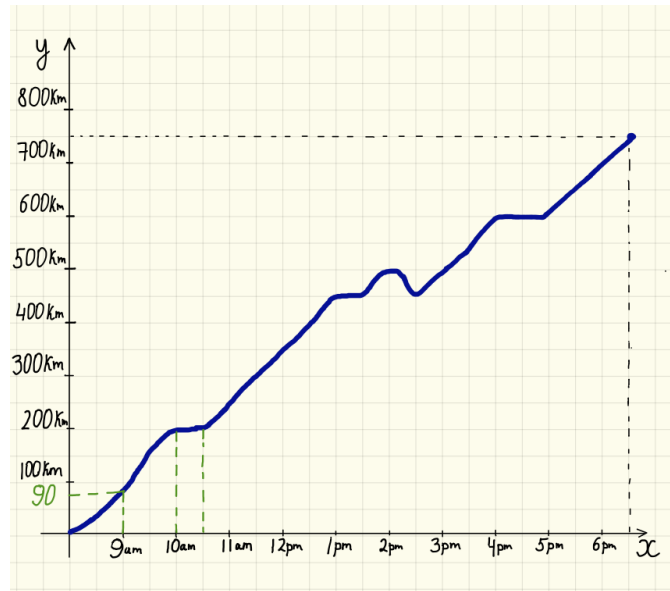


## Assignment 6

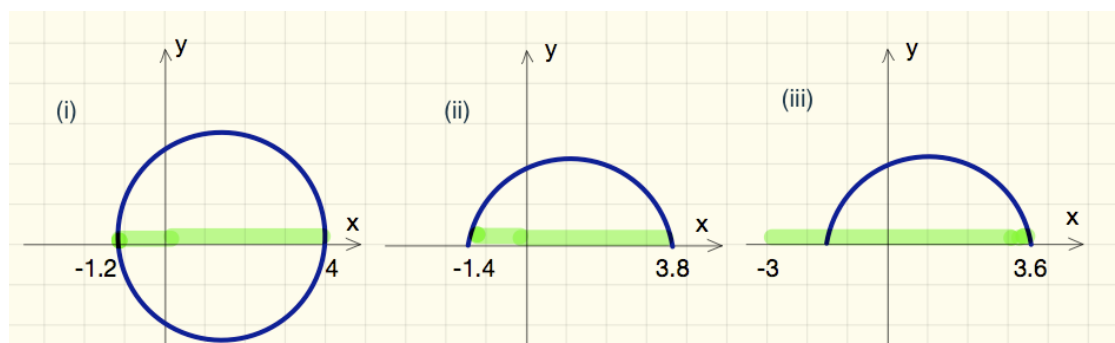
**Question 1.** [4 marks] Mary starts driving from Armidale at 8 *am*, heading to Canberra. The graph below shows the distance on the road from Armidale as a function of time.



- (i) Mary stopped three times for a rest on her way to Canberra. How long was her first stop?
- (ii) On which time interval the graph is decreasing? Is the car moving towards Armidale, or towards Canberra during this time interval?
- (iii) How many kilometres has Mary travelled by 5:30pm?
- (iv) How much time did Mary need to travel the first 200 *km*?

**Question 2.** [3 marks] Use the vertical line test to decide if the graph on the given domain represents a function or not.

- (i) The domain is the interval  $[-1.2, 4]$ .
- (ii) The domain is the interval  $[-1.4, 3.8]$ .
- (iii) The domain is the interval  $[-3, 3.6]$ .



**Question 3.** [3 marks] Calculate the value of the function  $f(x)$  at the given points.

- (i)  $f(x) = -3x + 2$  at  $x = -4$ ,
- (ii)  $f(x) = x^2$  for  $x = \frac{1}{5}$  and  $x = -\frac{1}{5}$ ,
- (iii)  $f(x) = \frac{8}{x+1}$  for  $x = 8$  and  $x = \frac{1}{8}$ ,

**Question 4.** [6 marks] A function is given by the graph below, the domain  $[-5, 5]$  and the codomain  $[-5, 5]$ . Answer the following questions.



- (i) What is the range of this function?
- (ii) Find the coordinates of the points where the function is zero.
- (iii) What are the intervals where the function is strictly positive/ strictly negative?

- (iv) What are the intervals where the function is increasing/ decreasing?
- (v) Is the function concave up or concave down on the interval  $[-4.5, -1]$ ?
- (vi) List the coordinates of all critical points of the function. Approximate the coordinates to one decimal place.
- (vii) Find the coordinates of the local maxima/ local minima.
- (viii) Find the coordinates of the global maxima/ global minima.
- (ix) Use the horizontal line test to decide if this function is invertible.
- (x) Restrict the domain and the codomain so that the function becomes invertible on the restricted domain. (There are many solutions for this question, give only one of them.)

**Question 5.** [4 marks] Let  $f(x)$  be the function given by the formula

$$f(x) = -x + 2$$

on the domain  $\mathbb{R}$ . Use the definition of increasing/decreasing functions to decide if  $f(x)$  is increasing or decreasing.