

EXERCISE for Tuesday May 8

ANSWERS

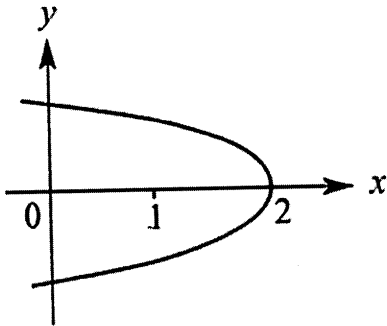
Question 1

Is the relation: $\{(1,3), (2,4), (3,6), (7,3)\}$ a one to one function? Give a reason for your answer.

No, There are two x -values with the same y value.

Question 2

The graph shown is of the relation



$$\{(x, y) : y^2 = -x + 2, x \leq 2\}$$

From this relation, form two functions with domain $(-\infty, 2]$ and specify the range of each.

$$y^2 = -x + 2$$

$$y = \pm \sqrt{-x + 2}$$

$$u : (-\infty, 2] \rightarrow \mathbb{R}, u(x) = \sqrt{-x + 2}$$

$$v : (-\infty, 2] \rightarrow \mathbb{R}, v(x) = -\sqrt{-x + 2}$$

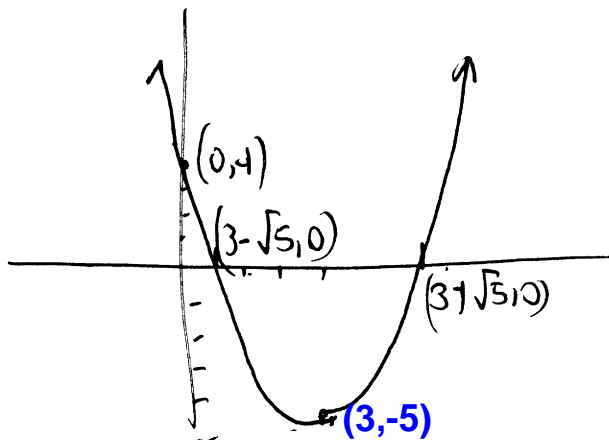
Question 3

Consider the function $g: \mathbb{R} \rightarrow \mathbb{R}, g(x) = x^2 - 6x + 4$

a. Write $g(x)$ in the form: $(x - h)^2 + k$ and sketch its graph.

$$g(x) = x^2 - 6x + 3^2 - 3^2 + 4$$

$$g(x) = (x - 3)^2 - 5$$



x -ints: let $y = 0$

$$(x - 3)^2 = 5$$

$$x - 3 = \pm \sqrt{5}$$

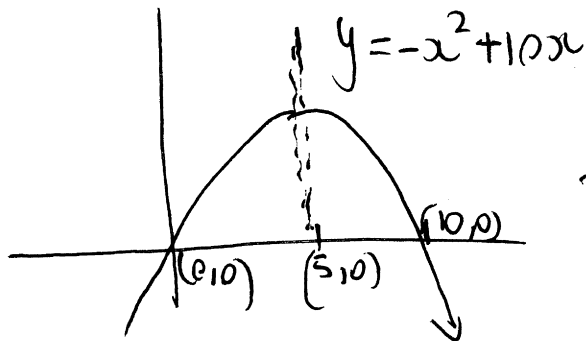
- b. By splitting the parabola down its axis of symmetry, define two separate one to one functions that have the same rule as g .

$$u: (-\infty, 3] \rightarrow \mathbb{R}, u(x) = x^2 - 6x + 4$$

$$v: [3, \infty) \rightarrow \mathbb{R}, v(x) = x^2 - 6x + 4$$

Question 4

Let $g: [b, \infty) \rightarrow \mathbb{R}, g(x) = -x^2 + 10x$. State the smallest value of b for which $g(x)$ is a one to one function.

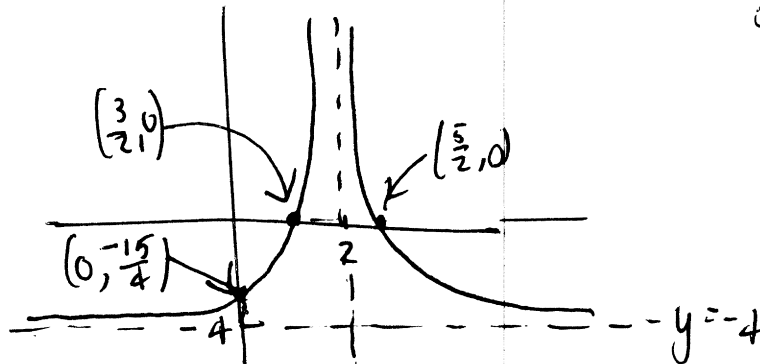


Lowest value of b
for which $g: [b, \infty) \rightarrow \mathbb{R},$
 $g(x) = -x^2 + 10x$
is one-to-one,
is $b = 5$.

Question 5

Let $h: \mathbb{R} \setminus \{2\} \rightarrow \mathbb{R}, h(x) = \frac{1}{(x-2)^2} - 4$

- a. Sketch the graph of $h(x)$, stating its domain and range.



Let $u: (-\infty, 0] \rightarrow \mathbb{R}, u(x) = \frac{1}{(x-2)^2} - 4$: $x = 2$

- b. Sketch the graph of $u(x)$.

a-int: let $y = 0$

$$0 = \frac{1}{(x-2)^2} - 4$$

$$\therefore 4(x-2)^2 = 1$$

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

$$x-2 = \pm \frac{1}{2}$$

$$\therefore x = \frac{5}{2}, \frac{3}{2}$$

c. Is $u(x)$ a one to one function?

No

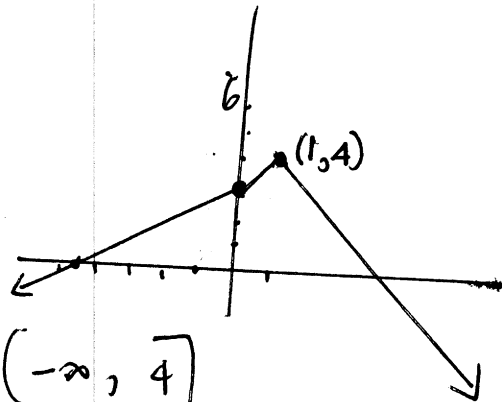
d. State the range of $u(x)$.

$$(-4, \infty)$$

Question 6

a. Sketch the graph of the function:

$$f(x) = \begin{cases} \frac{2}{3}x + 3, & x < 0 \\ x + 3, & 0 \leq x \leq 1 \\ -2x + 6, & x > 1 \end{cases}$$

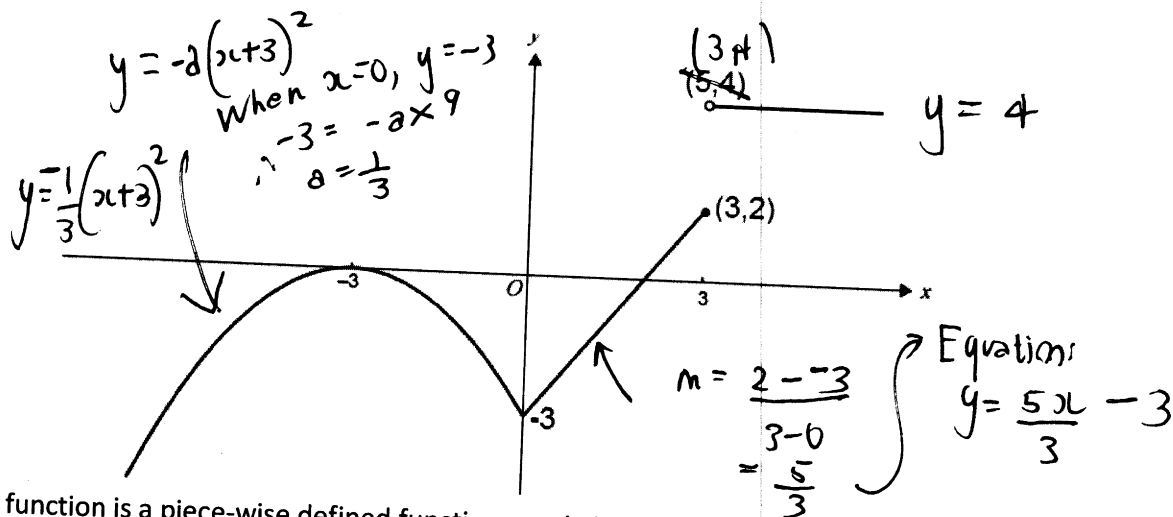


b. What is the range of f ?

Range: $(-\infty, 4]$

Question 7

The diagram below shows a function v with a domain R .



The function is a piece-wise defined function consisting of a quadratic part and two linear parts, one of which is horizontal.

a. Specify the function represented by this graph.

$$f(x) = \begin{cases} -\frac{1}{3}(x+3)^2, & x \leq 0 \\ \frac{5x}{3} - 3, & 0 < x \leq 3 \\ 4, & x > 3 \end{cases}$$

b. Evaluate: i. $f(2)$ ii. $f(-4)$

(i) $f(2) = \frac{10}{3} - 3 = \frac{1}{3}$ (ii) $f(-4) = \frac{-1}{3}(-4+3)^2 = \frac{-1}{3}$