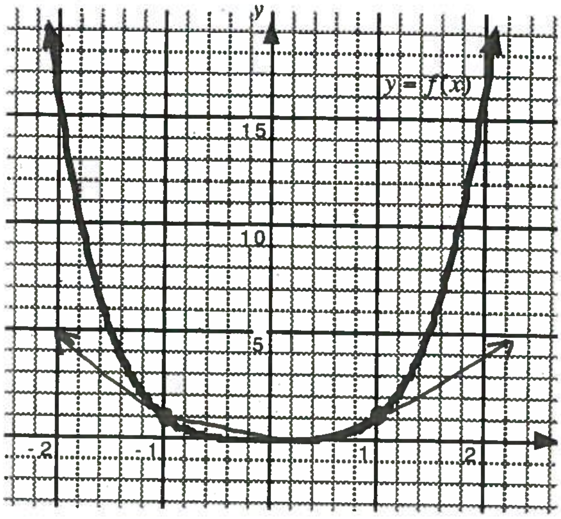
Assignment

1. The graph of a function $y = f(x)$ is shown.



a) Sketch the graph of $y = \sqrt{f(x)}$ on the grid.

b) State the domain of

i) $y = f(x)$ $x \in R$

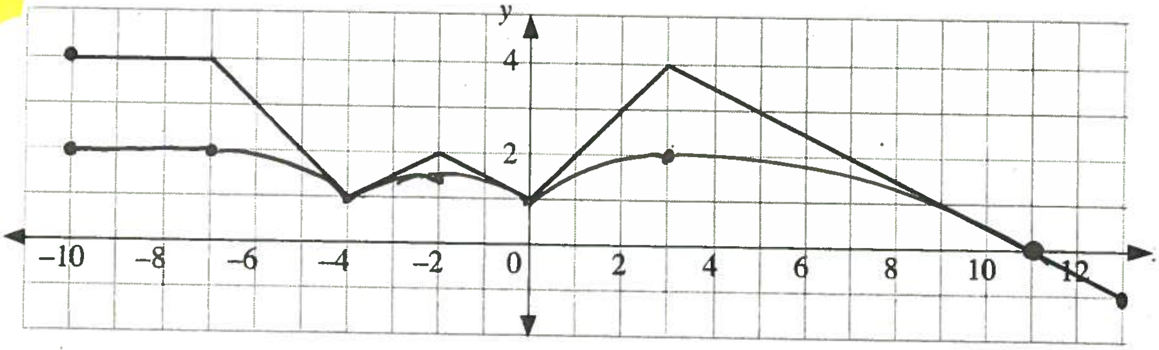
ii) $y = \sqrt{f(x)}$ $x \in R$

c) State the range of

i) $y = f(x)$ $y \mid y \geq 0, y \in R$

ii) $y = \sqrt{f(x)}$ $y \mid y \geq 0, y \in R$

2. a) The graph of a function $y = f(x)$ is shown. Sketch the graph of $y = \sqrt{f(x)}$ on the grid



b) State the domain of

i) $y = f(x)$ $x \mid -10 \leq x \leq 13, x \in R$ ii) $y = \sqrt{f(x)}$ $x \mid -10 \leq x \leq 11, x \in R$.

c) State the range of

i) $y = f(x)$ $y \mid -1 \leq y \leq 4, y \in R$ ii) $y = \sqrt{f(x)}$ $y \mid 0 \leq y \leq 2, y \in R$.

3. Given that $y = f(x)$ is a continuous function,

a) explain how you can determine the domain of $y = \sqrt{f(x)}$ from the graph of $y = f(x)$.

→ the domain of $y = \sqrt{f(x)}$ is the same as that part of the domain of $y = f(x)$ for which $f(x) \geq 0$

→ If f(x) is completely below x-axis, then $y = \sqrt{f(x)}$ does not exist + there is no domain.

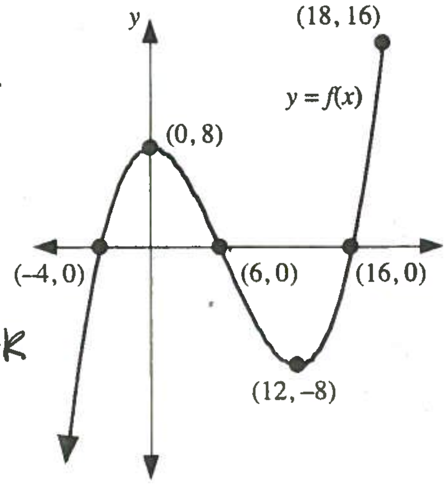
b) explain how you can determine the range of $y = \sqrt{f(x)}$ from the graph of $y = f(x)$.

→ If f(x) has an x-int, the range of $y = \sqrt{f(x)}$ is from zero to the square root of the max. value of f (which could go forever)

→ If f(x) is completely above the x-axis, the range is from the square root of the min. value of "f" to the square root of the max value of "f".

→ If f(x) is completely below the x-axis, then $y = \sqrt{f(x)}$ does not exist + there is no range

4. The graph of a function $y = f(x)$ is shown.



a) State the domain and range of the function $y = f(x)$.

$x \mid x \leq 18, x \in R$

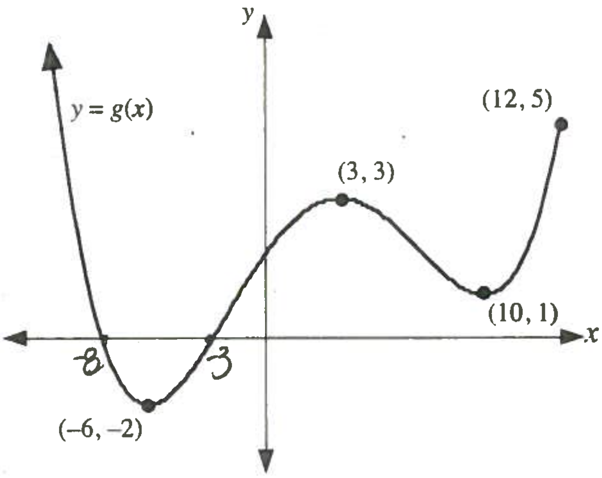
$y \mid y \leq 18, y \in R$.

b) Without sketching the graph of $y = \sqrt{f(x)}$, determine the domain and range of the function $y = \sqrt{f(x)}$.

$x \mid -4 \leq x \leq 6$ or $16 \leq x \leq 18, x \in R$

max $\sqrt{16} = 4$. $\quad y \mid 0 \leq y \leq 4, y \in R$.

5. The zeros of the function g are −8 and −3. The graph of $y = g(x)$ is shown below. Determine the domain and range of the function $y = \sqrt{g(x)}$.



domain of $\sqrt{g(x)}$

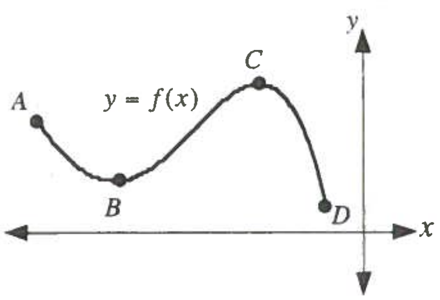
$x \mid x \leq -8$ or $-3 \leq x \leq 12, x \in R$

range of $\sqrt{g(x)}$

$y \mid y \geq 0, y \in R$

(infinite max ∴ infinite range.)

6. The points $A\left(-12, \frac{9}{4}\right)$, $B(-9, 1)$, $C(-4, 3)$, and $D\left(-2, \frac{1}{4}\right)$ lie on the graph of $y = f(x)$ as shown. Determine the domain and range of the function $y = \sqrt{f(x)}$.



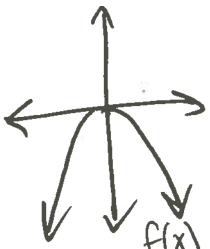
domain of $f(x)$ $\quad x \mid -12 \leq x \leq -2, x \in R$.

range of $f(x)$ $\quad y \mid \frac{1}{4} \leq y \leq 3, y \in R$

domain of $\sqrt{f(x)}$ $\quad x \mid -12 \leq x \leq -2, x \in R$

range of $\sqrt{g(x)}$ $\quad y \mid \frac{1}{2} \leq y \leq \sqrt{3}, y \in R$.

7. Olivia was investigating how the graph of $y = \sqrt{f(x)}$ is connected to the graph of $y = f(x)$. She chose the example $y = f(x) = -x^2$. When she graphed $y = \sqrt{f(x)}$, she deduced from tl empty screen on her graphing calculator that this graph does not exist for any values of x. Explain why Olivia's deduction is incorrect.



$f(x) = -x^2$

The graph of $y = \sqrt{-x^2}$ only exists at the point (0,0). It cannot be seen on the calculator screen because it is hidden by the axes.

Use the following information to answer the next two questions.

$y = f(x)$ is a continous function with domain $\{x \mid -4 \le x \le 16, x \in R\}$ and range $\{y \mid -4 \le y \le 16, y \in R\}$.

Multiple Choice

8. The domain of the function $y = \sqrt{f(x)}$ is

A. $\{x \mid -4 \le x \le 16, x \in R\}$

B. $\{x \mid 0 \le x \le 16, x \in R\}$

C. $\{x \mid 0 \le x \le 4, x \in R\}$

D. unable to be determined from the given information

we do not know where $f(x) \ge 0$

9. The range of the function $y = \sqrt{f(x)}$ is

A. $\{y \mid -4 \le y \le 16, y \in R\}$

B. $\{y \mid 0 \le y \le 16, y \in R\}$

C. $\{y \mid 0 \le y \le 4, y \in R\}$

D. $\{y \mid -2 \le y \le 4, y \in R\}$

10. The range of the function $y = \sqrt{f(x)}$ is $\{y \mid y \ge 2, y \in R\}$. Which one of the following statements regarding the function f **must** be true?

A. The maximum value of f is 4.

B. The function f has no zeros.

C. The graph of $y = f(x)$ has no y-intercept.

D. The domain of f is $x \in R$.

min value of $f = 2^2 = 4$

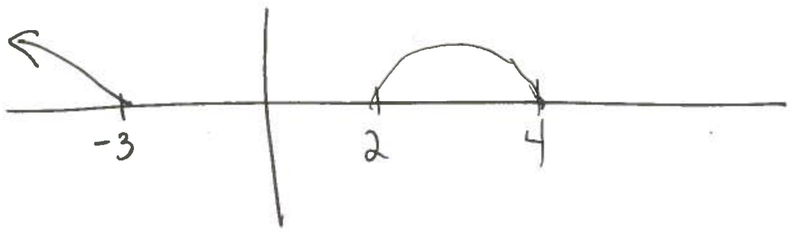
11. f is a continuous function with zeros -3, 2, and 4. The domain of $y = \sqrt{f(x)}$ is the set of real numbers such that $x \le -3$ or $2 \le x \le 4$. Which of the following values is negative?

A. $f(-4)$ (+)

B. $f(-3)$ 0

C. $f(-2)$ (−)

D. $f(3)$ (+)



Numerical Response **12.** The domain of $y = \sqrt{f(x)}$ is $x \in R$ and the range is $a \le y \le b$ where $y \in R$. If the minimum and maximum values of $y = f(x)$ are 12 and 36 respectively, then the product ab can be written in the form $k\sqrt{3}$, $k \in N$. The value of k is _____ .

(Record your answer in the numerical response box from left to right.)

1	2		

min value of $\sqrt{f(x)} = \sqrt{12} = 2\sqrt{3}$

max value of $\sqrt{f(x)} = \sqrt{36} = 6$

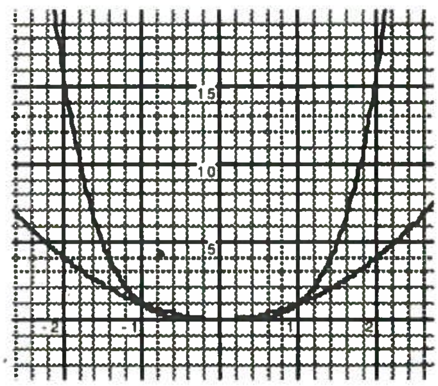
$y \mid 2\sqrt{3} \le y \le 6$

$a = 2\sqrt{3}$ $\quad ab = (2\sqrt{3})(6) = 12\sqrt{3}$, $k = 12$

$b = 6$

Answer Key

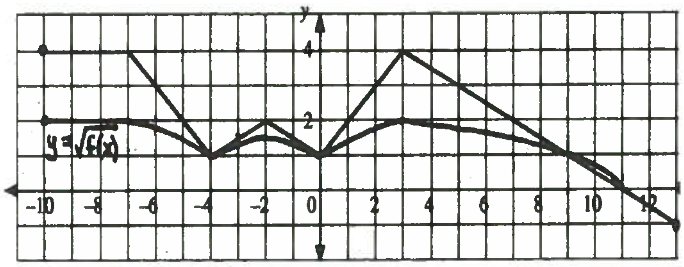
1. a)



b)i) $\{x \mid x \in R\}$ **ii)** $\{x \mid x \in R\}$

c)i) $\{y \mid y \ge 0, y \in R\}$ **ii)** $\{y \mid y \ge 0, y \in R\}$

2. a)



b)i) $\{x \mid -10 \le x \le 13, x \in R\}$ **ii)** $\{x \mid -10 \le x \le 11, x \in R$

c)i) $\{y \mid -1 \le y \le 4, y \in R\}$ **ii)** $\{y \mid 0 \le y \le 2, y \in R\}$

3. a) The domain of $y = \sqrt{f(x)}$ is the same as that part of the domain of $y = f(x)$ for which $f(x) \ge 0$. If $f(x)$ is completely below the x-axis, then $y = \sqrt{f(x)}$ does not exist, and there is no domain.

b) If $f(x)$ has an x-intercept, the range of $y = \sqrt{f(x)}$ is from zero to the square root of the maximum value of f (which could be infinite).

If $f(x)$ is completely above the x-axis, the range of $y = \sqrt{f(x)}$ is from the square root of the minimu value of f to the square root of the maximum value of f (which could be infinite).

If $f(x)$ is completely below the x-axis, then $y = \sqrt{f(x)}$ does not exist, and there is no range.

4. a) Domain $\{x \mid x \le 18, x \in R\}$ Range $\{y \mid y \le 16, y \in R\}$

b) Domain $\{x \mid -4 \le x \le 6$ or $16 \le x \le 18, x \in R\}$, Range $\{y \mid 0 \le y \le 4, y \in R\}$

5. Domain $\{x \mid x \le -8$ or $-3 \le x \le 12, x \in R\}$, Range $\{y \mid y \ge 0, y \in R\}$

6. Domain $\{x \mid -12 \le x \le -2, x \in R\}$ Range $\{y \mid \frac{1}{2} \le y \le \sqrt{3}, y \in R\}$

7. The graph of $y = -x^2$ is a parabola with a maximum point at (0, 0). The graph of $y = \sqrt{-x^2}$ will not exist when $-x^2$ is less than zero, but will exist when $x = 0$. The point (0, 0) is therefore the only point the graph of $y = \sqrt{f(x)}$. It cannot be seen on the calculator screen because it is hidden by the axes. By turning the axes off on the calculator, the point (0, 0) can be seen.

8. D **9.** C **10.** B **11.** C **12.**

1	2		