Part 1 – Radical Functions / Square Root of a Function

Answers are on the back page

1. For a function defined by $y = -2\sqrt{x+3} + 5$,

(a) State the domain and range, and explain how they relate to the parameters of the equation in the form $a\sqrt{x-h} + k$

(b) Algebraically determine any x, y intercepts *Exact values*

2. *Exam-style Question* **NR**

A radical function $r(x)$ has a domain of $x \geq -2$, a range $y \geq -3$, and has an x-intercept $x = -1$. For an equation in the form $y = a\sqrt{x-h} + k$, the value of a is ______.

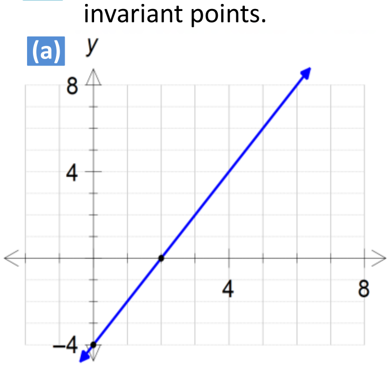
3. *Exam-style Question* **MC** (A) (B) (C) (D)

A radical function has an equation $y = -\sqrt{bx + 6}$. The domain of the function is:

A. $x \geq \frac{6}{b}$ **B.** $x \geq 6$ **C.** $x \geq \frac{-6}{b}$ **D.** $x \geq -6$

4. For each given graph of $y = f(x)$, sketch the graph of $y = \sqrt{f(x)}$, and state its domain, range, and any invariant points.

(a)

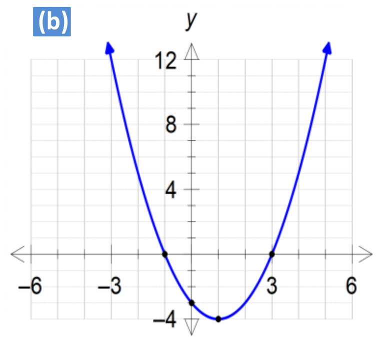


Domain of $y = \sqrt{f(x)}$:

Range of $y = \sqrt{f(x)}$:

Equation of $y = \sqrt{f(x)}$

(b)



Domain of $y = \sqrt{f(x)}$:

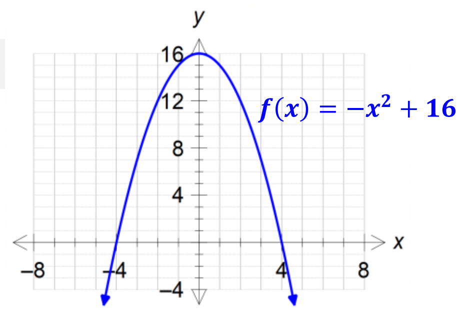
Range of $y = \sqrt{f(x)}$:

Equation of $y = \sqrt{f(x)}$

In form $y = \sqrt{(x-m)(x-n)}$

(c) For both functions above (from parts ***a*** and ***b***), determine the coordinates of any invariant points. *Exact values where applicable.*

5. Sketch the graph of $= \sqrt{f(x)}$ ➔, and state its domain, range, and coordinates of any invariant points. *Exact values where applicable.*



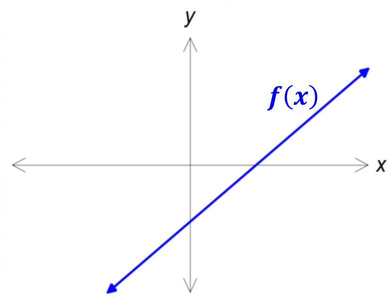
Use the following information to answer the following three questions

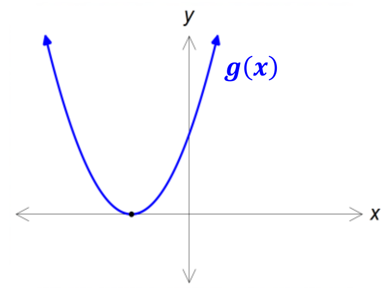
The graphs of two functions, $\boldsymbol{y = f(x)}$ and $\boldsymbol{y = g(x)}$ are shown. ➔

The graph of $f(x)$ is a line, while the graph of $g(x)$ is a parabola with its vertex on the origin.

A function $\boldsymbol{h(x)}$ is defined $h(x) = g(x) + 1$

A function $\boldsymbol{p(x)}$ is defined $p(x) = g(x) + 4$





6. ***Exam-style Question*** **NR**

The most likely domain for $y = \sqrt{f(x)}$ is _______ (*first digit*) and for $y = \sqrt{g(x)}$ is ______ (*second digit*).

Use the following codes to complete the sentence above

Possible domains **1** $x \in \mathbb{R}$ **2** $x \geq -1$ **3** $x \geq 3$ **4** $x \neq -1$ **5** $x \geq 0$ **6** $x \neq 3$

7. ***Exam-style Question*** **NR**

The most likely range for $y = \sqrt{f(x)}$ is _______ (*first digit*) and for $y = \sqrt{\boldsymbol{p(x)}}$ is ______ (*second digit*).

Use the following codes to complete the sentence above

Possible ranges **1** $y \in \mathbb{R}$ **2** $y \geq 0$ **3** $y \geq 1$ **4** $y \geq 2$ **5** $y \geq 3$ **6** $y \geq 4$

8. ***Exam-style Question*** **NR**

The number of invariant points on $y = \sqrt{f(x)}$ is _______ (*first digit*), for $y = \sqrt{g(x)}$ is ______ (*second digit*), and for $y = \sqrt{h(x)}$ is _____ (*third digit*).

Part 2 – Rational Functions

9. Given a function $y = \dfrac{2x - 5}{x + 1}$, determine (without the use of technology):

(a) The equation of any vertical asymptote

(b) The equation of any horizontal asymptote

(c) The value of any x or y intercepts

10. Determine (without the use of technology) any vertical or horizontal asymptote(s) for each given function:

(a) $f(x) = \dfrac{5}{x^2 - 3x - 4}$ **(b)** $f(x) = \dfrac{2x^2}{x^2 - 3x}$ **(c)** $f(x) = \dfrac{3}{x+1} - 2$

11. A function $g(x) = \dfrac{3(x+2)(x-a)}{(x-3)}$, where $a \in \mathbb{N}$, has a domain of $\{x \in \mathbb{R} \mid x \neq 3\}$ and a graph with no vertical asymptotes. Determine the x-intercept and coordinates of the point of discontinuity.

12. Given a function $y = \dfrac{x+3}{x^2 - x - 12}$, determine (without the use of technology):

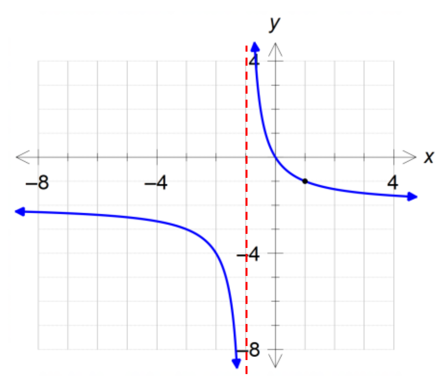
(a) The equation of any vertical asymptote(s)

(b) The equation of any horizontal asymptote

(c) The coordinates of any point(s) of discontinuity

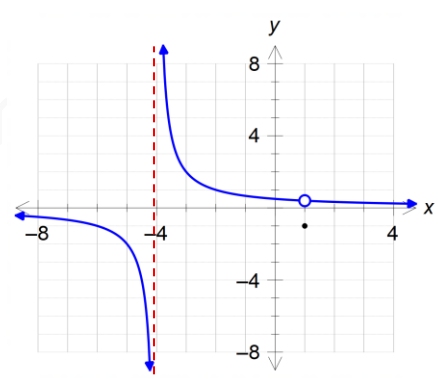
13. The rational function shown ➔ has a vertical asymptote at $x = -1$, passes through the origin, and passes through the point $(1, -1)$. Determine a possible equation, in the form

$$y = \frac{f(x)}{g(x)}$$ *where $f(x)$ and $g(x)$ are both linear functions*



14. The rational function shown ➔ has one vertical asymptote, one point of discontinuity, and passes through the point $(-3, 2)$. Determine a possible equation, in the form

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



Use the following information to answer the following three questions

A function $f(x)$ is given by $f(x) = \dfrac{a(x-b)(x-3)}{2x^2-5x-3}$, where $a \neq 0, b \neq 3$ and $b \in$ Integers

15. ***Exam-style Question*** The graph of $y = f(x)$ has a vertical asymptote at:

MC A B C D

A. $x = a$ **B.** $x = -\frac{1}{2}$ **C.** $x = b$ **D.** $x = 3$

16. ***Exam-style Question*** The graph of $y = f(x)$ has an x-intercept at:

MC A B C D

A. $x = a$ **B.** $x = 3$ **C.** $x = -\frac{1}{2}$ **D.** $x = b$

17. ***Exam-style Question*** The graph of $y = f(x)$ has a horizontal asymptote at:

MC A B C D

A. $y = a$ **B.** $y = 0$ **C.** $y = \dfrac{a}{2}$ **D.** $y = \dfrac{b}{2}$

18. ***Exam-style Question*** A rational function given by $y = \dfrac{x^2-5x+b}{x-a}$ has a point of discontinuity at $(3, 1)$.

NR

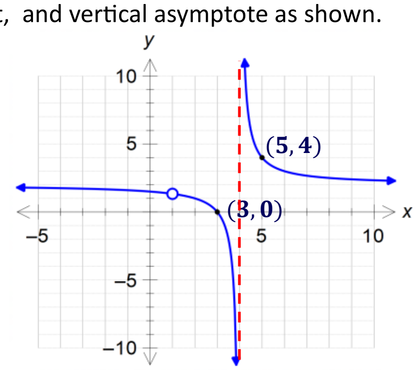
The value of a is _____ and the value of b is _____.
first digit *second digit*

19. ***Exam-style Question*** A rational function given by the graph shown has an equation of the form

NR

$y = \dfrac{a(x-1)(x-b)}{x^2-5x+c}$ *where a, b, and c are positive integers.* The graph has a point of discontinuity, an x-intercept, and vertical asymptote as shown.

The value of a is _____, b is _____, is _____.
first digit *second digit* *third digit*



Answers For full, worked-out solutions (as well as other practice materials) visit **www.rtdmath.com**)

1. (a) $x \geq -3,\ y \leq 5$ **(b)** $y = -2\sqrt{3} + 5$ $x = 3.25$ **2.** $a = 3$ **3.** C **4.(a)** $x \geq -2,\ y \geq 0,\ y = \sqrt{2x-4}$

4.(b) $x \leq -1$ or $x \geq 3$ $y \geq 0$ $y = \sqrt{(x+1)(x-3)}$ **4.(c)** *For (a)...* $(2, 0)$ & $(5/2, 1)$ *For (b)...* $(-1, 0), (3, 0), (1-\sqrt{5},\ 1), (1+\sqrt{5},\ 1)$

5. Domain: $[-4,\ 4]$ Range: $[0,\ 4]$ INV Pts: $(-4, 0), (4, 0), (-\sqrt{15},\ 1), (\sqrt{15},\ 1)$ **6.** 31 **7.** 24 **8.** 231

9. (a) $x = -1$ **(b)** $y = 2$ **(c)** $x = 5/2,\ y = -5$ **10. (a)** $x = -1$ and $4, y = 0$ **(b)** $x = 0$ and $3, y = 2$ **(c)** $x = -1, y = -2$

11. $(3, 15)$ **12. (a)** $x = 4$ **(b)** $y = 0$ **(c)** $(-3, -1/7)$ **13.** $y = \dfrac{-2x}{x+1}$ **14.** $y = \dfrac{2(x-1)}{x^2+3x-4}$

15. B **16.** D **17.** C **18.** 36 **19.** 234 *This practice exam is provided by RTD Learning - for use by Alberta students and teachers*