

Brett Robbins Academic Consulting

Math 30-1 Practice Test

Rational Functions

25 Questions

Original practice questions written to the Alberta curriculum, in the style of past diploma examinations. Work through each question, then check your answers with the key at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.

Question 1

The non – permissible values of the function $f(x) = \frac{x+3}{(x-2)(x+5)}$ are

- A) $x \neq 2$
- B) $x \neq -5$
- C) $x \neq 2$ and $x \neq -5$
- D) no restrictions

Question 2

The equation of the vertical asymptote of the graph of $y = \frac{3x+1}{x-4}$ is

- A) $x = -4$
- B) $x = 4$
- C) $y = 4$
- D) $x = 3$

Question 3

The graph of $y = \frac{5x-2}{3x+7}$ has a horizontal asymptote with equation $y = \frac{a}{b}$, where $\frac{a}{b}$ is in lowest terms.

The value of $a + b$ is

Question 4

The graph of $f(x) = \frac{x^2-9}{(x-3)(x+1)}$ has a vertical asymptote with equation

- A) $x = 3$
- B) $x = -3$
- C) $x = -1$
- D) $x = 1$

Question 5

The solution to the equation $\frac{x}{x-2} = 3$ is

- A) 6
- B) 3
- C) -3
- D) 2

Question 6

The vertical asymptotes of the graph of $y = \frac{1}{x^2 - 5x + 6}$ are

- A) $x = 2$
B) $x = -2$ and $x = -3$
C) $x = 0$
D) $x = 2$ and $x = 3$

Question 7

The behaviour of the graph of $y = \frac{2x}{x-3}$ near its vertical asymptote is described in row

- A) As $x \rightarrow 3^-$, $y \rightarrow -\infty$
As $x \rightarrow 3^+$, $y \rightarrow +\infty$
- B) As $x \rightarrow 3^-$, $y \rightarrow +\infty$
As $x \rightarrow 3^+$, $y \rightarrow -\infty$
- C) As $x \rightarrow 3^-$, $y \rightarrow +\infty$
As $x \rightarrow 3^+$, $y \rightarrow +\infty$
- D) As $x \rightarrow 3^-$, $y \rightarrow -\infty$
As $x \rightarrow 3^+$, $y \rightarrow -\infty$

Question 8

The point of discontinuity on the graph of $f(x) = \frac{x^2 - x - 6}{x - 3}$ is at

- A) $(-3, 5)$
B) $(3, 2)$
C) $(3, 5)$
D) $(3, -5)$

Question 9

The equation of the oblique asymptote of the graph of $y = \frac{x^2 + 2x + 3}{x + 1}$ is

A) $y = x + 2$

B) $y = x + 1$

C) $y = x$

D) $y = x + 3$

Question 10

The graph of $y = \frac{2x^2 + 3x - 2}{x^2 - x - 6}$ has exactly one vertical asymptote, with equation $x = k$.

The value of k is

Question 11

When the equation $\frac{1}{x-2} + \frac{1}{x+2} = \frac{4}{x^2-4}$ is solved algebraically, the result is

A) $x = 2$

B) $x = -2$

C) no solution

D) $x = 0$

Question 12

The equation $x + \frac{6}{x} = 5$ has two solutions.

The sum of the solutions is

Question 13

The graph of $f(x) = \frac{x^2 + 2x - 8}{x + 4}$ has a point of discontinuity at (m, n) .

The value of $m + n$ is

Question 14

For the function $f(x) = \frac{2x^2 - 8}{(x - 2)(x + 5)}$, the vertical asymptote and the horizontal asymptote are shown in row

A) Vertical asymptote : $x = -5$

Horizontal asymptote : $y = 2$

B) Vertical asymptote : $x = 2$

Horizontal asymptote : $y = 2$

C) Vertical asymptote : $x = -5$

Horizontal asymptote : $y = 1$

D) Vertical asymptote : $x = -5$

Horizontal asymptote : $y = -2$

Question 15

Which of the following statements about the graph of $y = \frac{1}{x^2 - 4}$ is true?

A) The x -intercepts are -2 and 2

B) The horizontal asymptote is $y = -4$

C) There is a point of discontinuity at $(0, -\frac{1}{4})$

D) The vertical asymptotes are $x = 2$ and $x = -2$

Question 16

For the function $y = \frac{x-1}{x^2-x-6}$, the vertical asymptotes and the x -intercept are shown in row

A) Vertical asymptotes : $x = 3$ and $x = -2$

x -intercept : 1

B) Vertical asymptotes : $x = 3$ and $x = -2$

x -intercept : -1

C) Vertical asymptotes : $x = -3$ and $x = 2$

x -intercept : 1

D) Vertical asymptotes : $x = 3$

x -intercept : 1

Question 17

The horizontal asymptote of the graph of $y = \frac{kx^2+3x}{2x^2-5}$ is $y = 4$.

The value of k is

Question 18

The equation of the oblique asymptote of the graph of $y = \frac{2x^2-3x+5}{x-2}$ is

A) $y = 2x + 7$

B) $y = 2x + 1$

C) $y = 2x - 1$

D) $y = x + 1$

Question 19

Which of the following statements about the graph of $y = \frac{x+1}{x^2-1}$ is true?

- A) The vertical asymptote is $x = -1$
- B) The horizontal asymptote is $y = 1$
- C) The x -intercept is -1
- D) There is a point of discontinuity at $(-1, -\frac{1}{2})$

Question 20

The vertical asymptotes of the graph of $y = \frac{x+4}{2x^2+5x-3}$ are $x = a$ and $x = b$.

The value of $a + b$ is

Question 21

The average cost, in dollars, for a company producing x units is modelled by $C(x) = \frac{12x+400}{x}$.

As the number of units produced increases, the average cost approaches

- A) 400 dollars
- B) 0 dollars
- C) 12 dollars
- D) 412 dollars

Question 22

A rational function has a vertical asymptote at $x = -3$, a horizontal asymptote at $y = 2$, and an x -intercept of 1. An equation of the function is

- A) $y = \frac{2x-2}{x+3}$
- B) $y = \frac{2x+2}{x+3}$
- C) $y = \frac{x-1}{2x+6}$
- D) $y = \frac{2x-2}{x-3}$

Question 23

The graph of $y = \frac{x^2 + x - 12}{x^2 - 9}$ has a point of discontinuity at $(3, n)$.

The value of n , to the nearest hundredth, is

Question 24

For the function $y = \frac{3x-7}{x-2}$, the vertical asymptote and the horizontal asymptote are shown in row

A) Vertical asymptote : $x = 2$

Horizontal asymptote : $y = 3$

B) Vertical asymptote : $x = -2$

Horizontal asymptote : $y = 3$

C) Vertical asymptote : $x = 2$

Horizontal asymptote : $y = -\frac{7}{2}$

D) Vertical asymptote : $x = 3$

Horizontal asymptote : $y = 2$

Question 25

As x approaches 3 from the left, the graph of $y = \frac{1}{(x-3)(x+2)}$ approaches

A) $-\infty$

B) $+\infty$

C) 0

D) $\frac{1}{5}$

Answer Key

- | | | |
|------|---------|----------|
| 1. C | 10. 3 | 19. D |
| 2. B | 11. C | 20. -2.5 |
| 3. 8 | 12. 5 | 21. C |
| 4. C | 13. -10 | 22. A |
| 5. B | 14. A | 23. 1.17 |
| 6. D | 15. D | 24. A |
| 7. A | 16. A | 25. A |
| 8. C | 17. 8 | |
| 9. B | 18. B | |

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