MHF4U1 RATIONAL FUNCTIONS PRACTICE TEST

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

____ 1. What is the *x*-intercept of the function $f(x) = \dfrac{x^2 - 5x + 4}{x - 1}$?

a. $x = 1$ and $x = 4$
c. $x = -4$
b. $x = 1$
d. $x = 4$

____ 2. What is the domain of the function $f(x) = \dfrac{x + 3}{x^3 - 1}$?

a. $\{x | x \neq -1, 1, x \in R\}$
c. $\{x | x \neq -1, x \in R\}$
b. $\{x | x \neq 1, x \in R\}$
d. $\{x | x \neq -3, x \in R\}$

____ 3. What is the oblique asymptote for $f(x) = \dfrac{x^2 - 3x + 2}{x + 2}$?

a. $y = 12$
c. $y = x - 5 + \dfrac{12}{x + 2}$
b. $y = x - 5$
d. $y = \dfrac{12}{x + 2}$

____ 4. Which of the following functions does not have a vertical asymptote?

a. $y = \dfrac{x + 3}{x^2 - 5}$
c. $y = \dfrac{x^2 - 9}{x + 3}$
b. $y = \dfrac{x}{(x - 3)^2}$
d. $y = -\dfrac{2}{x}$

____ 5. Which of the following functions does not have a horizontal asymptote?

a. $y = \dfrac{x^3 - 3x^2 + 3x - 1}{x^2 - 5}$
c. $y = \dfrac{x + 1}{x - 1}$
b. $y = \dfrac{x^2 - 1}{x^3 + 8}$
d. $y = \dfrac{3x^2 - 5x + 2}{2x^2 - 5}$

____ 6. What are the zeros of $f(x) = \dfrac{(x - 3)(x + 2)}{x(x + 5)(x - 1)}$?

a. $x = 3, -2, -5, 1, 0$
c. $x = 3, -2$
b. $x = -5, 1$
d. $x = 0, -5, 1$

____ 7. Which of the following statements is false for the function $f(x) = \dfrac{g(x)}{h(x)}$ where both *g* and *h* are polynomial functions?

a. It is possible to have both a vertical asymptote and a horizontal asymptote.
b. It is possible to have both an oblique asymptote and a horizontal asymptote.
c. It is possible to have both a vertical asymptote and an oblique asymptote.
d. It is impossible to have an oblique asymptote, a horizontal asymptote, and a vertical asymptote.

____ 8. What is the horizontal asymptote of $f(x) = \dfrac{x-2}{x+1}$?

a. $y = 2$
b. $y = -1$
c. $y = 0$
d. $y = 1$

____ 9. What are the vertical asymptotes of $f(x) = \dfrac{x^2-9}{x^2-7x+10}$?

a. $x = 2$ and $x = 5$
b. $x = -2$ and $x = -5$
c. $x = 3$ and $x = -3$
d. $x = 1$

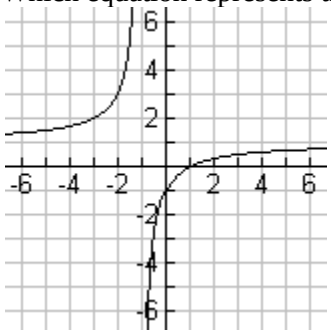
____ 10. Which of the following functions has an oblique asymptote?

a. $y = \dfrac{x^2-3x-4}{x^2-4}$
b. $y = \dfrac{x^2-4}{x+3}$
c. $y = \dfrac{x+3}{x^2-5x-14}$
d. $y = \dfrac{(x-3)^2}{(x-3)(x+4)}$

____ 11. Which of the following functions has a vertical asymptote at $x = 2$ and a horizontal asymptote of $y = 1$?

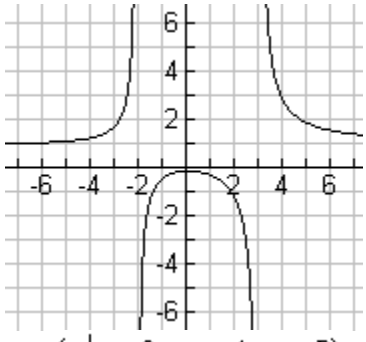
a. $y = \dfrac{x^2-6x+9}{x^2+3x+2}$
b. $y = \dfrac{3}{x-2}$
c. $y = \dfrac{x+3}{x^2-4}$
d. $y = \dfrac{x^2-9}{x^2-4x+4}$

____ 12. Which equation represents the following graph?



a. $f(x) = \dfrac{x+1}{x-1}$
b. $f(x) = \dfrac{x^2+1}{x+1}$
c. $f(x) = \dfrac{x-1}{x+1}$
d. $f(x) = \dfrac{x^2+1}{x-1}$

____ 13. What is the domain of the following function?



a. $\{x \mid x < 0 \cup x > 1, x \in R\}$
b. $\{x \mid x \neq -3, 2, x \in R\}$
c. $\{x \mid x \in R\}$
d. $\{x \mid x \neq -2, 3, x \in R\}$

____ 14. Describe the characteristics of the function $f(x) = \dfrac{x^2 - 4}{x + 2}$?

a. the vertical asymptote is $x = -2$
b. the horizontal asymptote is $y = 0$
c. the oblique asymptote is $y = x - 2$
d. there is a point discontinuity

____ 15. For which function below does $f(x) = -\infty$ when $x \to 2^+$?

a. $f(x) = \dfrac{1}{x - 2}$
b. $f(x) = \dfrac{1}{2 - x}$
c. $f(x) = \dfrac{x^2 - 4}{x - 2}$
d. $f(x) = \dfrac{x^2 - 4}{2 - x}$

____ 16. Which function below has no horizontal asymptote?

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

17. Solve $\dfrac{4x}{x+2} = \dfrac{5x}{3x+1}$

18. a) Solve using critical points $\dfrac{1}{x+3} \le 4$

b) Sketch the two functions and shade the area that satisfies the inequality.

19. Sketch $f(x) = \dfrac{5x - 2}{x + 3}$, showing all asymptotes and intercepts on your graph.

20. a) For the function $\dfrac{(x-3)}{(2x-3)(x+2)(x-5)}$ determine the asymptotes, domain, intercepts and behavior as *f(x)* approaches the vertical asymptote

b) Use the information to sketch the graph of the function.

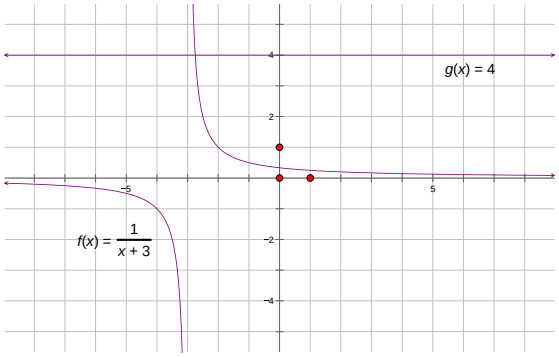
Text book questions:
Pg 309 #9
Pg 262 #1 – make sure you can explain your answer.

Answers:

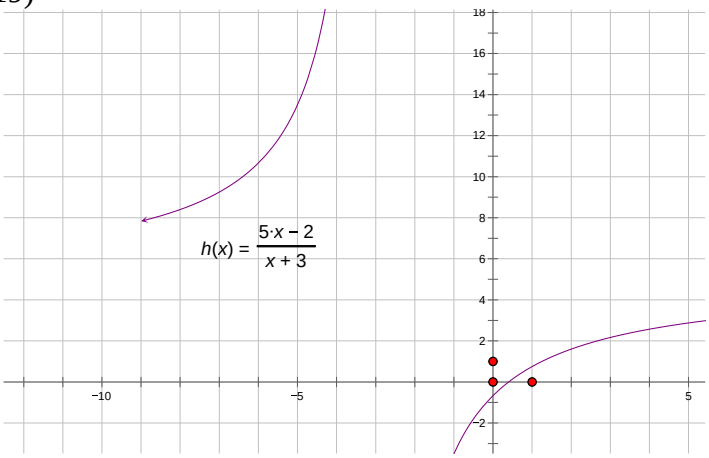
1) A 2) B 3) B 4) C 5) A 6) C 7) B 8) D 9) A 10) B
11) D 12) C 13) D 14) B 15) B 16) C

17) x = 0 or 6/7

18) $x < -3,\ x \geq -2.75$



19)



20) b.