1. *Chapter 2, Section 2.5, Question 001

Write the domain of the function $r(x) = \dfrac{7x^3 - 9x^2 + 11}{x^2 - 7}$ as a union of intervals.

Enter the exact answer.

2. *Chapter 2, Section 2.5, Question 005

Find all the asymptotes of the graph of the function $r(x) = \dfrac{40x^4 + 4x^3 - 11}{5x^4 + 7x^2 + 3}$.

If an asymptote does not exist, enter "NS".

Vertical asymptote: $x =$ **NS**

Horizontal asymptote: $y =$ **8**

3. *Chapter 2, Section 2.5, Question 007

Find all the asymptotes of the function $r(x) = \dfrac{6x + 1}{x^2 + x - 20}$.

Enter your answers in increasing order. If an asymptote does not exist, enter "NS".

Vertical asymptotes: $x =$ **-5** , **4**

Horizontal asymptote: $y =$ **0**

4. *Chapter 2, Section 2.5, Question 010

Suppose $r(x) = \dfrac{5x + 4}{x^2 + 1}$, $s(x) = \dfrac{x^2 + 2}{2x - 1}$.

Write the expression $(r - s)(x)$ as a simplified ratio with the numerator and denominator each written as a fully simplified polynomial. Do not use parentheses and asterisks in your answer.

$(r - s)(x) =$

5. *Chapter 2, Section 2.5, Question 019

Suppose $r(x) = \dfrac{2x + 5}{x^2 + 1}$, $t(x) = \dfrac{5}{4x^3 + 3}$.

Write the expression $(r(x))^2 t(x)$ as a simplified ratio with the numerator and denominator each written as a sum of terms of the form cx^m.

$(r(x))^2 t(x) =$

6. *Chapter 2, Section 2.5, Question 022

Suppose $r(x) = \dfrac{4x + 5}{x^2 + 1}$, $s(x) = \dfrac{x^2 + 2}{2x - 1}$.

Write the expression $(s \circ r)(x)$ as a simplified ratio with the numerator and denominator each written as a sum of terms of the form cx^m.

$(s \circ r)(x) =$

7. *Chapter 2, Section 2.5, Question 023

Suppose $r(x) = \dfrac{5x + 8}{x^2 + 1}$, $t(x) = \dfrac{6}{5x^3 + 4}$.

Write the expression $(r \circ t)(x)$ as a simplified ratio with the numerator and denominator each written as a sum of terms of the form cx^m .

$(r \circ t)(x) =$

8. *Chapter 2, Section 2.5, Question 025

Suppose $s(x) = \dfrac{x^2 + 4}{2x - 1}$.

Write the expression $\dfrac{s(1 + x) - s(1)}{x}$ as a simplified ratio with the numerator and denominator each written as a sum of terms of the form cx^m .

$\dfrac{s(1 + x) - s(1)}{x} =$

9. *Chapter 2, Section 2.5, Question 030

Suppose $s(x) = \dfrac{x+2}{x^2+9}$. Find two distinct numbers x such that $s(x) = \dfrac{1}{6}$.

Enter the exact answers in increasing order.

$x =$

$x =$

10. Chapter 2, Section 2.5, Question 032

Suppose $s(x) = \dfrac{x+2}{x^2+5}$. What is the range of s ?

Enter your answer in interval notation.

11. *Chapter 2, Section 2.5, Question 035

Write $\dfrac{x^2}{2x-1}$ in the form $G(x) + \dfrac{R(x)}{q(x)}$, where $q = 2x - 1$ is the denominator of the given expression and G and R are polynomials with $\deg R < \deg q$.

$G(x) =$

$R(x) =$

12. *Chapter 2, Section 2.5, Question 038

Write the expression $\frac{x^6 - 5x^2 + 3}{x^2 - 3x + 1}$ in the form $G(x) + \frac{R(x)}{q(x)}$ where

$q = x^2 - 3x + 1$ is the denominator of the given expression and G and R are

polynomials with $\deg R < \deg q$.

$G(x) =$

$R(x) =$

13. *Chapter 2, Section 2.5, Question 040

Find a number c such that $r\left(2^{1000}\right) \approx 9$, where

$$r(x) = \frac{5x^4 - 2x^3 + 8x + 7}{cx^4 - 9x + 9}.$$

Enter the exact answer.

$c =$ **5/9**

14. *Chapter 2, Section 2.5, Question 044

Suppose you start driving a car on a hot summer day. As you drive, the air conditioner in the car makes the temperature inside the car $F(t)$ degrees Fahrenheit at time t minutes after you started driving, where

$$F(t) = 95 - \frac{16t^2}{t^2 + 65}.$$

(a) What was the temperature in the car when you started driving?

The temperature in the car was **95** *1 degrees Fahrenheit.

(b) What was the approximate temperature in the car 15 minutes after you started driving?

Round your answer to the nearest degree.

The temperature in the car was **83** *2 degrees Fahrenheit.

(c) What will be the approximate temperature in the car after you have been driving for a long time?

The temperature in the car will be approximately **79** *3 degrees Fahrenheit.

**1 - significant digits not applicable; exact number, no tolerance*
**2 - significant digits not applicable; the absolute tolerance is +/-1*
**3 - significant digits not applicable; exact number, no tolerance*

15. *Chapter 2, Section 2.5, Question 050

Suppose r is the function with domain $(0, \infty)$ defined by

$$r(x) = \frac{1}{2x^4 + 3x^3 + 4x^2}$$

for each positive number x.

(a) Select the pair of points found on the graph of r.

a. $\left(2, \frac{1}{72}\right)$ and $\left(3, \frac{1}{75}\right)$

b. $\left(3, \frac{1}{279}\right)$ and $\left(4, \frac{1}{640}\right)$

c. $\left(2, \frac{1}{50}\right)$ and $\left(3, \frac{1}{75}\right)$

d. $\left(2, \frac{1}{72}\right)$ and $\left(3, \frac{1}{279}\right)$

e. $\left(3, \frac{1}{75}\right)$ and $\left(4, \frac{1}{768}\right)$

Answer: d

(b) Explain why r is a decreasing function on $(0, \infty)$.

a.

If a and b are in the domain of r (which means that a and b are positive numbers) and $a > b$, then

$$2a^4 + 3a^3 + 4a^2 < 2b^4 + 3b^3 + 4b^2$$

which implies that $r(a) > r(b)$. Thus r is a decreasing function on $(0, \infty)$.

b.

If a and b are in the domain of r (which means that a and b are positive numbers) and $a < b$, then

$$2a^4 + 3a^3 + 4a^2 > 2b^4 + 3b^3 + 4b^2$$

which implies that $r(a) > r(b)$. Thus r is a decreasing function on $(0, \infty)$.

c.

If a and b are in the domain of r (which means that a and b are positive numbers) and $a < b$, then

$$2a^4 + 3a^3 + 4a^2 < 2b^4 + 3b^3 + 4b^2$$

which implies that $r(a) < r(b)$. Thus r is a decreasing function on $(0, \infty)$.

d. If a and b are in the domain of r (which means that a and b are positive numbers) and $a < b$, then

$$2a^4 + 3a^3 + 4a^2 < 2b^4 + 3b^3 + 4b^2$$

which implies that $r(a) > r(b)$. Thus r is a decreasing function on $(0, \infty)$.

e.

If a and b are in the domain of r (which means that a and b are positive numbers) and $a > b$, then

$$2a^4 + 3a^3 + 4a^2 > 2b^4 + 3b^3 + 4b^2$$

which implies that $r(a) > r(b)$. Thus r is a decreasing function on $(0, \infty)$.

Answer: d

(c) Select the pair of points found on the graph of r^{-1}.

a. $\left(\frac{1}{72}, 2\right)$ and $\left(\frac{1}{75}, 3\right)$

b. $\left(\frac{1}{279}, 3\right)$ and $\left(\frac{1}{640}, 4\right)$

c. $\left(\frac{1}{50}, 2\right)$ and $\left(\frac{1}{75}, 3\right)$

d. $\left(\frac{1}{72}, 2\right)$ and $\left(\frac{1}{279}, 3\right)$

e. $\left(\frac{1}{75}, 3\right)$ and $\left(\frac{1}{768}, 4\right)$

Answer: d

16. *Chapter 2, Review Exercises, Question 043

Suppose $r(x) = \dfrac{400x^{50} + 398}{x^{48} - 102}$ and $s(x) = \dfrac{x^7 + 2}{x^4 + 8}$. Which is larger, $r\left(10^{100}\right)$ or $s\left(10^{100}\right)$?

a. $r\left(10^{100}\right)$ is larger.

b. $s\left(10^{100}\right)$ is larger.

Answer: b