1. Chapter 2, Section 2.5, Question 001

Write the domain of the function \( r(x) = \frac{7x^3 - 9x^2 + 11}{x^2 - 7} \) 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 \( r(x) = \frac{40x^4 + 4x^3 - 11}{5x^4 + 7x^2 + 3} \).

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

Vertical asymptote: \( x = \) 

Horizontal asymptote: \( y = \)

3. Chapter 2, Section 2.5, Question 007

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

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

Vertical asymptotes: \( x = \), 

Horizontal asymptote: \( y = \) 

4. Chapter 2, Section 2.5, Question 010

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

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

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

\[(r(x))^2t(x) = \]
6. Chapter 2, Section 2.5, Question 022

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

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

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 \( s(x) = \frac{x^2 + 4}{2x - 1} \).

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

\[
\frac{s(1 + x) - s(1)}{x} =
\]

9. Chapter 2, Section 2.5, Question 030

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

Enter the exact answers in increasing order.

\( x = \)
10. Chapter 2, Section 2.5, Question 032

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

Enter your answer in interval notation.

11. Chapter 2, Section 2.5, Question 035

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

\( G(x) = \)
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 \( \deg R < \deg q \).

\[
R(x) =
\]
\[
G(x) =
\]
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.

$c =$ 

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 $*1$ 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 $*2$ 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 $*3$ 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. \((2, \frac{1}{72})\) and \((3, \frac{1}{75})\)

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

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

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

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

Answer: 

(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.

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

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

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

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

Answer: ________

(c) Select the pair of points found on the graph of \(r\).
16. Chapter 2, Review Exercises, Question 043

Suppose \( \frac{a}{b} \) and \( \frac{c}{d} \). Which is larger, or ?

a. \( \frac{a}{b} \) is larger.

b. \( \frac{c}{d} \) is larger.

Answer: _________