WORK SHEET 2 FOR GRADE 11 ON RATIONAL FUNCTION

1994/2. Which of the following is the solution set of the inequality $\frac{x^2+1}{x^2-1} > 0$?

A) $\{x: x < -1 \text{ or } x > 1\}$ **C)** $\mathbb{R} \setminus \{-1, 1\}$

B) $x: -1 < x < 1$ **D)** $\mathbb{R}$

1994/12.Let $f(x) = x + 1 + \frac{x-1}{x}$. Then which of the following is NOT true ?

A) $-1+\sqrt{2}$is an x-intercept of the graph of the function .

B) $-1-\sqrt{2}$is an x-intercept of the graph of the function .

C) The graph of the function f does not have a y-intercept .

D) The line $y = x + 1$ is an oblique asymptote to the graph of f .

1994/16.Let $f(x) = \frac{4}{(x-5)^2}$, then which of the following is NOT true ?

A) $f$is an even function

B) The line $x = 5$ is a vertical asymptote of the graph .

C) $\{f(x): f(x) > 0\}$is the range of f

D) The graph of f is symmetric with respect to the line $x = 5$.

1994/18. The solution set of the inequality $\left|\frac{x^2+2x+1}{x^2-4}\right| > 0$ is

A) $\{x: x \text{ is real and } x \neq -2, -1, 2\}$ **C)** $\{x: x \text{ is real and } x > 0\}$

B) The set of all real numbers. **D)** $\{x: x \text{ is real and } x \neq -2, 2\}$

1994/37. If x= 2 and $y = \frac{1}{3}$, then $\frac{\frac{1}{x}-\frac{1}{y}}{1-\frac{y}{x}} \div \frac{1}{\frac{1}{y}-\frac{3y}{x}}$ is equal to :

A) – 1 **B)** $-\frac{15}{2}$ **C)** $-\frac{6}{5}$ **D)** $\frac{6}{5}$

1995/3. Which of the following is the solution set of the equation

$\frac{x+1}{2-2x^2} + \frac{6}{x+1} = \frac{2x-1}{x^2-1} - \frac{1}{2-2x}$ **?**

A) $\emptyset$ **B)** $\left\{\frac{8}{7}\right\}$ **C)** $\left\{\frac{5}{3}\right\}$ **D)** $\{2\}$

1995/13. If $f(x) = \frac{16-x^4}{x^3-8}$, the which of the following is true about the function ?

A) $x = \sqrt{2}$is a vertical asymptote . **C) $x = -2$is a vertical asymptote .**

B) $y = x$is an oblique asymptote **D) $y = -x$ is an oblique asymptote**

1995/46. The solution set of $\frac{x^2-6x}{x-12} > 1$is :

A) $(3, 4)$ **B)** $(12, \infty)$ **C)** $[3,4] \cup (12, \infty)$ **D)** $(3, 4) \cup (12, \infty)$

1998/6. Which of the following is true about $f(x) = \frac{x}{x-1} - \frac{1}{x+1}$?

A) The domain of f is $\mathbb{R} \setminus \{1\}$ C) As x increases the value of $f$gets decreasing

B) The range of f is $\mathbb{R}$ D) $y = 1$ is a horizontal asymptote to the graph of f

1998/12. The expression $\frac{x}{x^3-1} \div \left(2 - \frac{1}{1+\frac{1}{x-2}}\right)$ is equal to

A) $\frac{1}{x^2+x+1}, x \neq 1, 2$ **C)** $\frac{1}{x^2+x+1}, x \neq 0, 1, 2$

B) $\frac{x-4}{x^2+x+1}, x \neq 1, 2$ **D)** $\frac{1}{x^2+x-1}, x \neq 0, 1, 2$

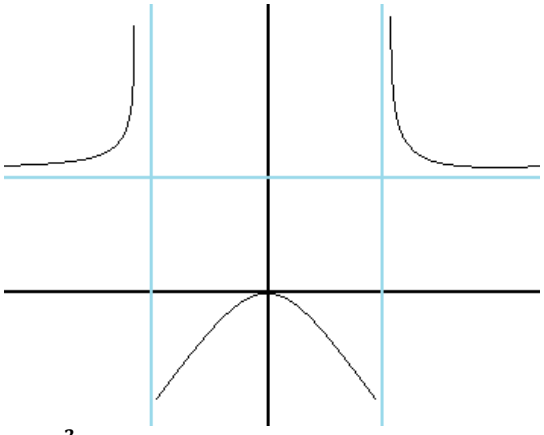
1998/20. The function $g(x) = \frac{x^2-x+1}{x+1}$ is decreasing on

A) $[-3,1]$ B) $[-3,-1)\cup(-1,1]$ C) $(-\infty,-3]\cup[1,\infty)$ D) $(-1,1]$

1999/6. The respective values of A and B so that $\frac{x-4}{x^3+2x}=\frac{A}{x}+\frac{Bx+C}{x^2+2}$ are:

A) $-2,2$ B) $2,-2$ C) $2,1$ D) $2,-1$

1999/7.Which of the following functions could most likely be sketched as in the figure shown below?



A) $g(x)=\frac{x^2}{1-x^2}$

B) $g(x)=\frac{1-x}{1-x^2}$

C) $g(x)=\frac{x^2}{x^2-1}$

D) $g(x)=\frac{x}{x^2-1}$

1999/8.The simplified form of the expression $\left(\frac{x+7}{x^2-x-6}\right)\div\left(\frac{2}{x-3}+\frac{-1}{x+2}\right)$ is equal to :

A) $\frac{-1}{x^2-x-6}$

B) $\frac{1-2x}{(x-3)(x+2)}$

C) 1

D) $\frac{(x+7)(x-3)(x+2)}{x^2-x-6}$

1999/10.Which of the following is the solution set of the inequality $\frac{1}{x+2}-\frac{1}{x}\geq 2$

A) $(0,\infty)$ B) $(-2,0)$ C) $(-\infty,-2)\cup(0,\infty)$ D) $(-\infty,-2)$

2000/9. What is the solution set of the inequality $\frac{2x}{x+1}<5$?

A) $\left(-\frac{5}{3},\infty\right)$

B) $\left(-\infty,-\frac{5}{3}\right)\cup(-1,\infty)$

C) $(-\infty,-2)\cup\left(\frac{5}{2},\infty\right)$

D) $\emptyset$

2000/11. What are the values of a and b which make the mathematical statement $\frac{x+1}{x^2-9}=\frac{a}{x-3}+\frac{b}{x+3}$ true?

A) $a=1,\ b=0$ B) $a=\frac{1}{3},b=\frac{3}{5}$ C) $a=\frac{-2}{5},b=1$ D) $a=\frac{2}{3},b=\frac{1}{3}$

2000/13. Which of the following is the domain of the function $f(x)=\frac{(x+1)x^{-2}}{x^2+1}$?

A) $\mathbb{R}\setminus\{1,-1\}$ B) $\mathbb{R}\setminus\{0,-1\}$ C) $\mathbb{R}\setminus\{0\}$ D) $\mathbb{R}$

2001/11. The value of x where the graph of $y=\frac{x^2-1}{x^3}$ crosses its horizontal asymptote is(are)

A) $x=-2$ B) $x=0$ C) $x=-1\ and\ x=1$ D) $x=-\sqrt{2}\ and\ x=\sqrt{2}$

2001/14. Which one of the following represent the solution set for the equation $\frac{1}{x-2}=\frac{3}{x+2}-\frac{6x}{x^2-4}$?

A) $\left\{-\frac{1}{2},\frac{1}{2}\right\}$ B) $\{-4,2\}$ C) $\{-2\}$ D) ϕ

2001/27. Which one of the following is the solution set of the inequality $\frac{1}{1-\frac{1}{x}} \leq \frac{x}{x^2-1}$?

A) $(-1, 1)$ **C)** $(-1,0) \cup (0, -1)$

B) $[-1, 0) \cup (0, -1]$ **D)** $(-\infty, -1) \cup (1, \infty)$

2002/6. Which of the following is a rational function ?

A) $f(x) = \frac{\sqrt{2}x^2 - x + \log 2}{x^4 + x^2 + \pi}$ **C)** $h(x) = \frac{x^2 - 2^x + x}{x^4 + x + 1}$

B) $g(x) = 3x^4 - \sqrt{x^2 + 1} + x$ **D)** $r(x) = \frac{x^2 + \sin x + 2}{x + 1}$

2002/7. If $p(x) = x - 4$, $q(x) = x^2 + 8$ and $q(x) = x^2 - 2x + 8$, then which of the following is the most simplified expression of $f(x) = \frac{x}{p(x)} - \frac{q(x)}{r(x)}$

A) $\frac{x}{x-4} - \frac{x^2+8}{x^2-2x-8}$ **B)** $\frac{8x}{x-4}$ **C)** $\frac{2}{x+2}$ **D)** $\frac{2x+8}{x^2-2x-8}$

2002/8. What is the solution set of $1 - \frac{1}{x+2} \leq \frac{-1}{x}$?

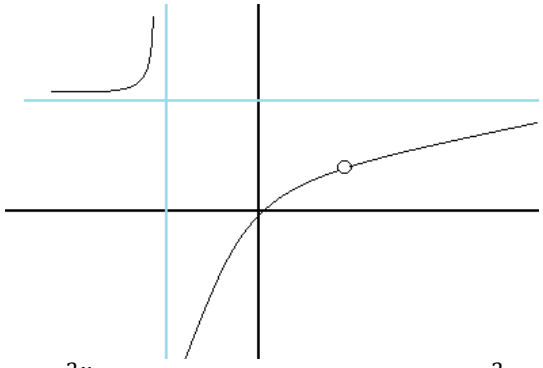
A) $(-2, 0)$ **B)** $(0, \infty)$ **C)** $(-\infty, -2)$ **D)** $(-\infty, -2) \cup (0, \infty)$

2002/9. Consider an airplane that flies in straight line from Addis to city X in a planned time.If it flies at the speed of 1000 km/hr, it will reach at X 30 minutes before the planned time .On the other hand ,if it flies at 900 km/hr it will reach there 20 minutes after the planned time

Which of the following is the distance between Addis Ababa and city X?

A) 8500 km **B) 8000 km** **C) 7500 km** **D) 7250 km**

2002/10. Which of the following function could most likely be sketched as in the figure below ?



A) $f(x) = \frac{2x}{x+1}$ C) $f(x) = \frac{2}{x+1}$

B) $f(x) = \frac{2x(x-1)}{x^2-1}$ D) $f(x) = \frac{2x^2}{x^2-1}$

2003/3. Which one of the following is the domain of $g(x) = x - \frac{x^2+1}{x^4+x}$?

A) $\mathbb{R} \setminus \{0\}$ B) $\mathbb{R} \setminus \{-1\}$ C) $\mathbb{R} \setminus \{0, 1\}$ D) $\mathbb{R} \setminus \{-1, 0\}$

2003/4.Which of the following is the simplified form of $\frac{t - \frac{1}{t}}{1 + \frac{t}{1-t}} \div \frac{t^2 - 2t + 1}{t}$, t≠ $0 and t \neq 1$

A) t + 1 B) $t - 1$ C) $1 - t$ D) $-t - 1$

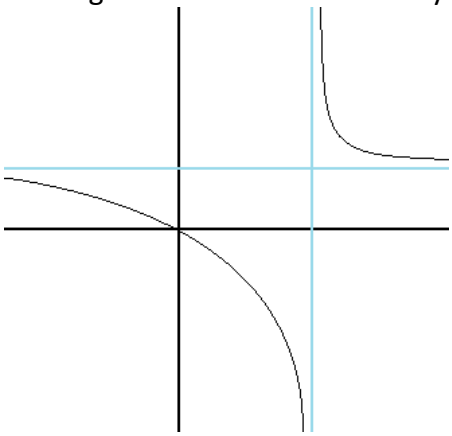
2003/5. What are the respective value of $A, BandC$, so that $\frac{x-1}{x^3+x} = \frac{A}{x} + \frac{Bx+C}{x^2+1}$

A) $-1, 1, 1$ B) $-1, 1, 2$ C) $1, -2, 0$ D) $3, 1, 2$

2003/6. What is the solution set of $1 - \frac{5}{x^2+4} = \frac{x-1}{x^2-x} - \frac{1}{x}$?

A) $\{1, -1\}$ B) $\{2\}$ C) $\{-1\}$ D) $\{1, 2, -1\}$

2003/9. Which of the following function could most likely be drawn as in the figure below ?



A) $f(x) = \frac{x}{x-2}$ C) $f(x) = \frac{x+1}{x-2}$

B) $f(x) = \frac{x^2+2x}{x^2-4}$ D) $f(x) = \frac{x^3+2x}{x^2-4}$

2003/12.Which of the following is not true about the graph of $g(x) = \frac{x^2-1}{x^2+1}$

A) The range of g is $(-\infty, 1)$ C) The line y=1 is a horizontal asymptote

B) $g$is an even function D) As $x \to -\infty$, $g(x) \to 1$

2004/4. Which of the following is a simplest form of $\frac{4-(a-2)^2}{a^4+2a^2+1} \div \frac{1-\frac{1}{a^2+1}}{a}$?

A) $\frac{4-a}{a}$ B) $--\frac{a}{a^2+1}$ C) $\frac{-1}{a^2(a^2+1)}$ D) $\frac{4-a}{a^2+1}$

2004/5. If $f(x) = \frac{x-1}{(x-2)^2(x+1)}$, which of the following is true about ?

A) Its graph has an oblique asymptote. C) As $x \to -1^+$, $f(x) \to -\infty$

B) The graph of f does not meet its asymptote. D) As $x \to 2^-$, $f(x) \to -\infty$

2005/16. Which of the following function has no vertical asymptote ?

A) $f(x) = ln(x+1)$ C) $f(x) = \frac{x^2-9}{x-3}$

B) $f(x) = \frac{x^2+1}{x^3+8}$ D) $f(x) = \frac{x-1}{x^2-x}$

2005/28 . What is the solution set of $\frac{2}{x} - \frac{x-2}{x^2-2x} = 1 - \frac{2x-2}{3x-2}$?

A) $\{1, -2\}$ B) $\{1, 2\}$ C) $\{-1\}$ D) $\{1\}$

2006/29. Which one of the following is true ?

A) A polynomial can have infinitely vertical asymptote.

B) The graph of a rational function can never cross its horizontal asymptote.

C) The graph of $f(x) = \frac{3x-1}{x-1}$ has no horizontal asymptote.

D) The graph of $f(x) = \frac{x^3-x}{x^2-x}$has no vertical asymptote.

2006/49. Which one of the following is true about the graph of $f(x) = \frac{x^2 - 1}{x - x^2}$?

A) $x = 0$ *and* $x = 1$are its vertical asymptotes.
B) $y = 1$is its horizontal asymptote.
C) $y = x - 1$is its oblique asymptote
D) It **is almost the same the horizontal line** $y = 1$ **as** $x \to \pm\infty$

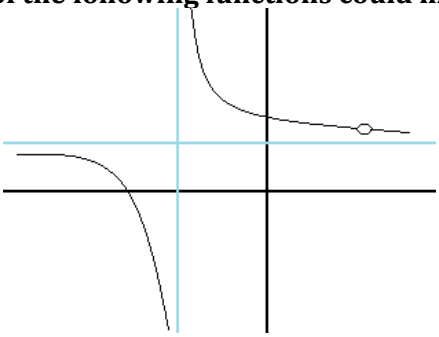
2007/31. The value of x **where the graph of the function** $y = \frac{x^2 - 1}{x^3}$ **crosses its horizontal asymptote is(are) ?**

A) $x = 2$ **B)** $x = -1$ *and* $x = 1$ **C)** $x = 0$ **D)** $x = -\sqrt{2}$ *and* $x = 1 + \sqrt{2}$

2007/32. If $p(x) = 3x^2$ **and**$q(x) = x^2 + x$ **, then what is the solution set of**$\frac{p(x)}{3q(x)} - \frac{1}{x} = \frac{1}{q(x)}$ **?**

A) $\{-1, 2\}$ **B)** $\{2\}$ **C)** $\{-3\ , 2\}$ **D)** $\{-3\}$

2007/47.Which of the following functions could most likely be drawn as the figure 1 below ?



A) $\frac{x + 3}{x + 2}$
B) $\frac{x^2 - 2x}{x^2 - 4}$
C) $\frac{-x^2 - x + 6}{x^2 - 4}$
D) $\frac{x^2 + x - 6}{x^2 - 4}$

2008/30.The solution set of the equation $\frac{x^2}{x + 3} + \frac{3x}{x^2 + 5x + 6} = \frac{2x}{x + 3}$ **?**

A) $\{0\ , 1\}$ **B)** $\{-1\ , 1\}$ **C)** $\{-1, 0, 1\}$ **D)** $\{-1, 0\}$

2008.44. For the rational function $f(x) = \frac{x^2 + 5x + 6}{x^2 + 1}$ **, which of the following is true ?**

A) vertical asymptotes are the line $x = -2$ *and* $x = -3$
B) Oblique asymptote is $y = 5x - 5$
C) Horizontal asymptote is $y = 1$
D) x-intercepts are 2 and 3

2008/2. What is the solution set of $\frac{1 - \frac{1}{x}}{1 - \frac{1}{x^2}} = 3x^2 - \frac{x}{1 + \frac{1}{x}}$ **?**

A) $\left\{-1, \frac{1}{3}\right\}$ **B)** $\left\{\frac{1}{3}\right\}$ **C)** $\left\{3, \frac{1}{3}\right\}$ **D)** $\left\{-\frac{1}{3}\right\}$

2008/3. Suppose $f(x) = \frac{Q(x)}{x(x^2 - 1)}$ **where Q**(x) **is a function .Which one of the following is necessarily true about the graph of** f **?**

A) $x = 0,\ x = 1$ *and* $x = -1$**are the vertical asymptotes of** f**.**
B) The graph of f **does not intersect with its horizontal asymptote.**
C) The vertical asymptote of the graph of f **is only** $x = -1$ **if** $Q(x) = x^2 - x$
D) The vertical asymptote of the graph of f **is only** $x = 1$ **if** $Q(x) = 2x^2$

2008/21. Which one of the following is true about the horizontal asymptote(s) of the graph of $y = \frac{|x| + 2}{x}$ **?**

A) $y = 2$**is the only horizontal asymptote of the graph .**
B)$y = 1$ *and* $y = -1$**are the horizontal asymptotes of the graph .**

C) $y = 2\ and\ y = -2$are the horizontal asymptotes of the graph .
D) $y = 1$is the only horizontal asymptote of the graph .

2009/14. What is the solution set of $\frac{1}{1+\frac{1}{x}} - \frac{1}{1-\frac{1}{x}} = \frac{x+\frac{1}{x}}{x-\frac{1}{x}}$?

A) $\emptyset$ B) $\{-1\}$ C) $\{1\}$ D) $\{-1, 1\}$

2009/15. Which one of the following is true about the graph of $f(x) = \frac{x^3 - x}{x^3(x-1)}$?

A) The vertical asymptotes of the graph are $= 0\ and\ x = 1$.
B) A horizontal asymptote of the graph is $y = 1$
C) The graph intersect its horizontal asymptote at the point$(-1, 0)$
D) The graph intersect the vertical line $x = 1$ at the point $(1, 2)$

2010/12. What is the partial fraction decomposition of $\frac{x^2 + x + 1}{(x+2)(x^2+1)}$?

A) $\frac{3}{5(x+2)} + \frac{2x+1}{5(x^2+1)}$
B) $\frac{5}{3(x+2)} + \frac{2x+1}{3(x^2+1)}$
C) $\frac{2}{5(x+2)} + \frac{3x+1}{5(x^2+1)}$
D) $\frac{2}{3(x+2)} + \frac{2x+1}{3(x^2+1)}$

2010/32. Which one of the following is true about the graph of$f(x) = \frac{2x^3 + 2x^2 + 3x}{x^2 + x}$

A) The vertical asymptotes of the graph is only $x = -1$ and its oblique asymptote is $y = 2x$
B) The graph has y- intercept at $(0, 3)$
C) The graph has at least one x-intercept .
D) The vertical asymptote of the graph are at $x = 0\ and\ x = -1$ but it has no horizontal asymptote

2011/20. What is the simplified form of $\frac{a^{-1}b^{-1}}{a^{-3} - b^{-3}}$?

A) $\frac{a^2 \cdot b^2}{b^2 - a^2}$ B) $\frac{a^2 \cdot b^2}{b^3 - a^3}$ C) $\frac{a^3 - b^3}{a.b}$ D) $\frac{a^3 - b^3}{a - b}$

2011/39. Which one of the following is true about the graph of$f(x) = \frac{x^2 + 5x + 6}{x^2 - 4} + 3$?

A) The graph has a hole at $x = 2$
B) The vertical asymptote of the graph are $x = -2\ and\ x = 2$
C) A horizontal asymptote of the graph is $y = 4$
D) The graph has y-intercept at $\left(0, \frac{-3}{2}\right)$

2012/5. Let $f(x) = \frac{x^2 - x}{2x^2 - x - 1}$, which of the following is NOT true about f and its graph ?

A) $x = -\frac{1}{2}$ is a vertical asymptote.
B) The graph of f has a hole at $\left(1, \frac{1}{3}\right)$
C) f is an even function .
D) $y = \frac{1}{2}$ is a horizontal asymptote .

2012/50. Given a rational function $f(x) = \frac{2x+4}{x-1}$ .Which of the following is NOT true about its graph. The graph has

A) a horizontal asymptote $y = 2$
B) a vertical asymptote, $x = 1$
C) y −intercept $at\ (0, -4)$
D) x −intercept at $(-4, 0)$

2013/16. Which of the following is the universal set of the expression $\frac{1}{x^2} + \frac{x+1}{x^2+x}$?

A) $\mathbb{R} \setminus \{0\}$ B) $\mathbb{R} \setminus \{0, 1\}$ C) $\mathbb{R} \setminus \{0, -1\}$ D) $\mathbb{R} \setminus \{0, 1, -1\}$

2013/17. The graph of a rational function is given as in the figure 1 below
Which of the following is NOT true about the graph ?

A) $y = 0$is its horizontal asymptote.
B) $x = 1$is its vertical asymptote .
C) It is increasing on $(-\infty,\ 1)$
D) It is decreasing on $(1, \infty)$