

Math 111 Final Exam Form B

Section _ _ _ Date _ _ _ _

Show all work or document calculator usage to receive full credit.

1. Find the exact solution(s): $-\frac{3}{x+2} + \frac{2}{x} = \frac{4x-4}{(x+2)(x-2)}$ $x = -1$ or $x = 2$

$x^2 - 6x - 8 = 0$

$$y = (x-6)^2 + 2 \quad (2 \text{ Pts})$$

$$-y = (-x)^4 - 2(-x)^2 - |-x| \quad \checkmark$$

$$-y = x^4 - 2x^2 - |x| \quad \checkmark$$

No. The resulting equation is not equivalent to the original equation.

(3 Pts)

notation.

$$|x-2| > 4$$

$$x-2 > 4 \quad \text{or} \quad x-2 < -4 \quad \checkmark$$

$$x > 6$$

$$x < -2$$



$$(-\infty, -2) \cup (6, \infty)$$

(4 Pts)

12 Graph $f(x) = \begin{cases} 2x & (3, x < 1) \\ -2x + 4 & (1, x < 3) \end{cases}$ (4Pt)

$\therefore f(x) = \begin{cases} 2x & (3, x < 1) \\ -2x + 4 & (1, x < 3) \end{cases}$

$\begin{array}{r} 30 \\ 30 \end{array}$

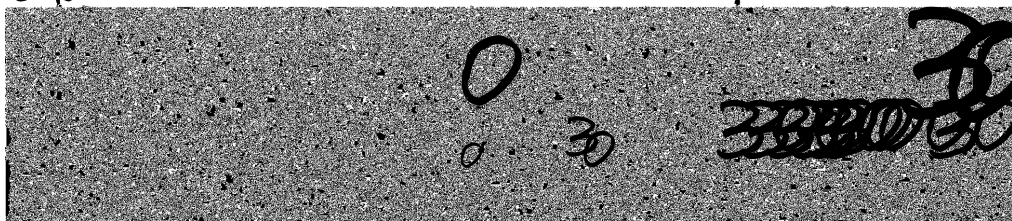
3

$0(x > 1)$

0
30

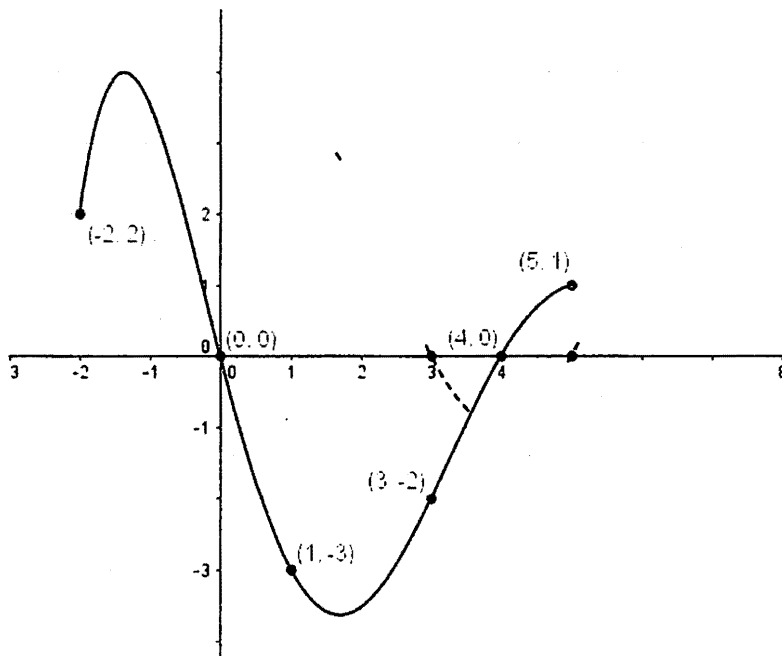


03 03



0
30

~~30 30 30~~ 30 30 30



ii) From the graph of $f(x)$, 1 is a rational zero.

$$\begin{array}{r|rrrr} 1 & 1 & -5 & 9 & -5 \\ & & 1 & -4 & 5 \\ \hline & 1 & -4 & 5 & 0 \end{array} \checkmark$$

$$x^2 - 4x + 5 = 0$$

$$x^2 - 4x + 4 = -5 + 4 \checkmark$$

$$(x-2)^2 = -1 \checkmark$$

$$x-2 = \pm i \checkmark$$

$$x = 2 \pm i \checkmark$$

1, 2+i, 2-i (6 Pts)

b) Factor $f(x)$ completely. Write as a product of linear factors.

$f(x) = (x-1)(x-(2+i))(x-(2-i))$ (2 Pts)

16. Find the critical values and solve the inequality. Give the solution in interval notation.

$$\frac{2-x}{3x+4} \geq 0.$$

Critical values: 2, $-\frac{4}{3}$ $\checkmark\checkmark$

$(2-x)$	②	①	③
	+		+
	+		-

$-\frac{4}{3}$ 2 \checkmark

$$B = 49000 \times 0.1 \times \left(1 + \frac{0.08}{12}\right)^{12(37)}$$

$$\approx \$93,635.74$$

\$93,635.74 (4 Pts)

20. Solve algebraically for x , writing solution(s) in exact form.

a) $5^{4x-7} = 125$

$$5^{4x-7} = 5^3$$

$$4x - 7 = 3$$

$$4x = 10$$

$$x = \frac{5}{2}$$

$\left\{\frac{5}{2}\right\}$ (3 Pts)

b) $\ln x - \ln(x-4) = \ln 3$

$$\ln\left(\frac{x}{x-4}\right) = \ln 3$$

$$\left(\frac{x}{x-4} = 3\right) \cdot (x-4)$$

$$x = 3(x-4)$$

$$x = 3x - 12$$

$$-2x = -12$$

$$x = 6$$

$\{6\}$ (4 Pts)

21. Given $f(x) = \frac{x^2 - x - 30}{x + 3} = \frac{(x-6)(x+5)}{x+3}$, determine the following, if it does not exist write "none":

a) the equation of the vertical asymptote.

$x = -3$ (1 Pt)

b) the equation of the horizontal asymptote.

none (1 Pt)

c) the equation of the oblique asymptote.

$y = x - 4$ (2 Pts)

$$\begin{array}{r|rr} -3 & 1 & -1 & -30 \\ & & -3 & 12 \\ \hline & 1 & -4 & -18 \end{array}$$

d) the x -intercept(s). Write answer(s) as ordered pairs.

$(6, 0), (-5, 0)$ (2 Pts)

e) the y -intercept. Write answer(s) as an ordered pair.

$(0, -10)$ (2 Pts)

22. Solve the following nonlinear system, giving the solution(s) as ordered pair(s).

$$\begin{cases} x^2 + 2y^2 = 9 \\ x^2 - y^2 = 6 \quad \times (2) \end{cases}$$

$$\Rightarrow \begin{cases} x^2 + 2y^2 = 9 \\ + (2x^2 - 2y^2 = 12) \\ \hline 3x^2 = 21 \\ x^2 = 7 \\ x = \pm\sqrt{7} \quad \checkmark \end{cases}$$

$$\begin{aligned} 7 + 2y^2 &= 9 \\ 2y^2 &= 2 \\ y^2 &= 1 \\ y &= \pm 1 \quad \checkmark \end{aligned}$$

$(\sqrt{7}, 1), (\sqrt{7}, -1)$ (4 Pts)

$(-\sqrt{7}, 1), (-\sqrt{7}, -1)$

23. Suppose the following matrix equation is true.

$$\begin{bmatrix} 3 & -1 \\ x & 4 \end{bmatrix} \begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 5 \\ 16 \end{bmatrix}$$

a) Set up an equation that can be used to find the value of x.

$$\begin{array}{c} \begin{bmatrix} 3 & -1 \\ x & 4 \end{bmatrix} \begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 3(2) + (-1)(1) \\ x(2) + 4(1) \end{bmatrix} = \begin{bmatrix} 5 \\ 16 \end{bmatrix} \\ \begin{array}{cc} 2 \times 2 & 2 \times 1 \end{array} \end{array}$$

$$\underline{2x + 4 = 16} \quad (2 \text{ Pts})$$

b) Determine the value of x.

$$\begin{array}{l} 2x = 12 \\ x = 6 \end{array}$$