Hon Pre-Calc
Test Chapter 2 Name ____________

Show All Work!!! Circle All Final Answers!! No Calculators!!!

Short Answer

1. Write in $a + bi$ (standard) form:

   a) $\dfrac{i}{(1+i)^2}$

   b) $\sqrt{-12} \bullet \sqrt{-8}$

2. A driver averaged 70 mph on the round trip between Rochester Hills, Michigan, and Grayling, Michigan, 140 miles away. The average speeds for going and returning were x and y miles per hour respectively. Find an equation solved for y in terms of x.

3. Consider: $f(x) = \dfrac{2x^2 + 5x + 2}{x^2 - 4}$

   a) Use interval notation to write the domain and range

   Domain =

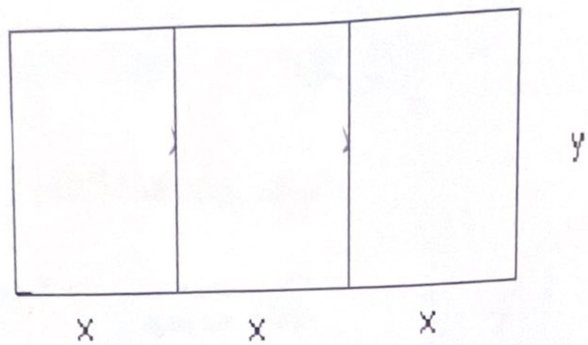
   Range =

   b) Use limit notation to describe the end behavior.

   c) Identify the x and y location of any holes (write answer as an ordered pair).

   d) Use limit notation to describe the behavior around any vertical asymptotes.

4. A rancher has 480 feet of fencing to enclose 3 adjacent rectangular corrals.



a) Write the area function in standard form in terms of x *(the length of one of the sections)* of the corral.

b) What should the value of x be to maximize the area?

5. An open box with locking tabs is to be made from a rectangular piece of material 3 inches on one side and 4 inches on the other. his is to be done by cutting equal squares from e corners and folding along the dashed lines shov n in the figure.

a) Write the function $V(x)$ t it represents the volume of the box.

b) Determine the domain of th unction.

c) Find the value of x that maxin e the volume.

6. Find the remainder: $\dfrac{x^3}{(x-1)^3}$

7. Find a polynomial with l coefficients of least degree with -2 (mult 2 nd $1+i\sqrt{3}$ as zeros that also has the followin d behavior:

$$\begin{cases} \lim\limits_{x\to\infty} f(x) = -\infty \\ \lim\limits_{x\to-\infty} f(x) = -\infty \end{cases}$$

8. A small theater has a seating capacity of 2000. When the ticket price is \$20, attendance is 1500. For each decrease of \$1 in ticket price the attendance increases by 50. What ticket price will yield the maximum revenue?

9. Find the location of the relative minimum of the function: $f(x) = -2x^3 - 3x^2 + 72x - 7$

10. Consider: $\dfrac{2x^3 + 3x^2 - 8x - 12}{x^2 + 3x + 2}$

a) Identify any vertical asymptotes

b) Identify any horizontal asymptotes

c) Identify any slant asymptotes

d) Identify the location of any holes

11. Consider: $f(x) = x^4 - 2x^3 + 3x^2 - 4x + 2$

a) Complete a P,N,I chart

b) List all possible rational zeros

c) Solve Completely

12. Find the domain of x for $\sqrt{\dfrac{x}{x^3 - x^2 - 12x}}$

13. Write the solution to the inequality using interval notation:

$$\frac{3}{x-1} + \frac{2x}{x+1} \geq -1$$

Hon Pre-Calc

Test Chapter 2 Name

81/95

Show All Work!!! Circle All Final Answers!! No Calculators!!!

Short Answer

1. Write in $a+bi$ (standard) form:

a) $\frac{i}{(1+i)^2}$

$\frac{i}{1+2i-1} = \frac{i}{2i} \times \frac{2i}{2i} = \frac{-2}{-4} = \boxed{\frac{1}{2}}$

b) $\sqrt{-12} \bullet \sqrt{-8}$

$i\sqrt{12} \times i\sqrt{8}$

$i\sqrt{96} = 4\sqrt{6}$

$\boxed{-4\sqrt{6}}$

2. A driver averaged 70 mph on the round trip between Rochester Hills, Michigan, and Grayling, Michigan, 140 miles away. The average speeds for going and returning were x and y miles per hour respectively. Find an equation solved for y in terms of x.

$d = rt$

$t = \frac{d}{r}$

$\frac{140}{x} + \frac{140}{y} = t_1 + t_2$

$280 = (70)(t_1 + t_2)$

$4 = t_1 + t_2$

$\frac{140}{x} + \frac{140}{y} = 4$

$140x + 140y = 4xy$

$140x = 4xy - 140y$

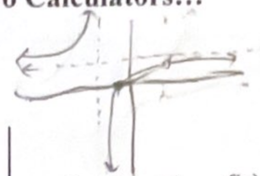
$140x = y(4x - 140)$

$\frac{140x}{4x-140} = y$

$\frac{4(35x)}{4(1-35x)} = y$

-2

$\boxed{y = \frac{35x}{1-35x}}$



$2x^2+4x+x+2$

$2x(x+2)+1(x+2) \rightarrow (2x+1)(x+2)$

3. Consider: $f(x) = \frac{2x^2+5x+2}{x^2-4} = \frac{(2x+1)(x+2)}{(x-2)(x+2)}$

$2 \quad -2$

a) Use interval notation to write the domain and range

Domain = $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

Range = $(-\infty, \frac{3}{4}) \cup (\frac{3}{4}, 2) \cup (2, \infty)$

b) Use limit notation to describe the end behavior.

$\lim_{x \to -\infty} f(x) \to 2$

$\lim_{x \to +\infty} f(x) \to 2$

c) Identify the x and y location of any holes (write answer as an ordered pair).

$(-2, \frac{3}{4})$

$\frac{2(-2)+1}{-2-2} = \frac{-3}{-4} = \frac{3}{4}$

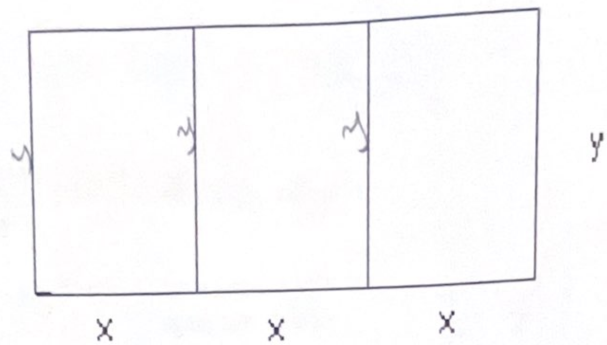
d) Use limit notation to describe the behavior around any vertical asymptotes.

$\lim_{x \to 2^-} f(x) \to +\infty$, 3

$\lim_{x \to 2^+} f(x) \to -\infty$

-5

4. A rancher has 480 feet of fencing to enclose 3 adjacent rectangular corrals.



a) Write the area function in standard form in terms of x *(the length of one of the sections)* of the corral.

$y = 240 - 3x)$

$6x + 2y = 480$

$3x + y = 240$

2

$A = 3x(240 - 3x)$

$A = 3xy$

b) What should the value of x be to maximize the area?

$A = 720x - 9x^2$

$0 = -x^2 + 80x$

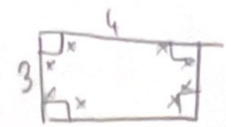
$0 = -2x + 80$

$2x = 80$

$x = 40$

$\boxed{40 \text{ feet}}$

2



1
1 1
1 2 1
1 3 3 1

5. An open box with locking tabs is to be made from a rectangular piece of material 3 inches on one side and 4 inches on the other. This is to be done by cutting equal squares from the corners and folding along the dashed lines shown in the figure.

a) Write the function $V(x)$ that represents the volume of the box.

$V(x)=x(3-2x)(4-2x)$

b) Determine the domain of the function.

$(0, \frac{3}{2})$

c) Find the value of x that maximize the volume.

$V(x)=x(3-2x)(4-2x)$

$V(x)=(3x-2x^2)(4-2x)$

$V(x)=12x-6x^2-8x^2+4x^3$

$V(x)=4x^3-14x^2+12x$

$0=12x^2-28x+12$

$0=3x^2-7x+3$

$x=\frac{7\pm\sqrt{(-7)^2-4(3)(3)}}{2(3)}$ $\quad \frac{7+3.5}{6}=\frac{10.5}{6}$

$x=\frac{7\pm\sqrt{49-36}}{6}$ $\quad \frac{10.5}{6}>\frac{3}{2}$

$x=\frac{7\pm\sqrt{13}}{6}$ $\quad \boxed{x=\frac{7-\sqrt{13}}{6} \text{ in}}$

6. Find the remainder: $\frac{x^3}{(x-1)^3}$ $= (x-1)(x^2+x+1)$

$1x^3(-1)^0+3x^2(-1)^1+3x^1(-1)^2+1x^0(-1)^3$

$$\begin{array}{r} 1 \\ x^3-3x^2+3x-1\overline{)\,x^3+0x^2+0x+0} \\ -x^3+3x^2-3x+1 \\ \hline 3x^2-3x+1 \end{array}$$

$\boxed{3x^2-3x+1}$

7. Find a polynomial with real coefficients of least degree with -2 (mult 2) and $1+i\sqrt{3}$ as zeros that also has the following end behavior:

$$\begin{cases} \lim_{x\to\infty} f(x)=-\infty \\ \lim_{x\to-\infty} f(x)=-\infty \end{cases}$$

$(x-(1+i\sqrt3))(x-(1-i\sqrt3))(x+2)^2$

$((x-1)-i\sqrt3)((x-1)+i\sqrt3)(x+2)^2$

$(x^2-2x+4)(x^2+4x+4)$

$x^4+4x^3+4x^2-2x^3-8x^2-8x+4x^2+16x+16$

$\boxed{x^4+2x^3-8x+16}$

2

-2

$x^2(2x+3)-4(2x+3)$
$(x^2-4)(2x+3)$

$5\overline{)1400}$ = 280

8. A small theater has a seating capacity of 2000. When the ticket price is $20, attendance is 1500. For each decrease of $1 in ticket price the attendance increases by 50. What ticket price will yield the maximum revenue?

(a) att	(p) price
1500	$20
1550	$19
1500+50x	20-x

$R=-50x^2-500x+30000$

$R=-x^2-10x+6000$

$R=ap$

$R=(1500+50x)(20-x)$

$R=30000-1500x+1000x-50x^2$

/3

9. Find the location of the relative minimum of the function: $f(x)=-2x^3-3x^2+72x-7$

$-6x^2-6x+72$

x^2-x+12

$(x-4)(x+3)$

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

$\boxed{x=-3}$

/2

10. Consider: $\dfrac{2x^3+3x^2-8x-12}{x^2+3x+2} = \dfrac{(x-2)(x+2)(2\ldots}{(x+2)(x+1)}$

a) Identify any vertical asymptotes

$x=-1$

b) Identify any horizontal asymptotes

$\boxed{\text{None}}$

$x^2+3x+2\overline{)2x^3+3x^2-8x-12}$ = $2x-3$
$-2x^3+6x^2+4x$
$-3x^2-12x$

c) Identify any slant asymptotes

$\boxed{y=2x-3}$

d) Identify the location of any holes

$\boxed{x=-2}$

/5

11.

11. Consider: $f(x) = x^4 - 2x^3 + 3x^2 - 4x + 2$

a) Complete a P,N,I chart

P	N	I
4	0	0
2	0	2
0	0	4

b) List all possible rational zeros

$\pm\{1, 2\}$ -1

c) Solve Completely

$$\begin{array}{r|rrrrr} 1 & 1 & -2 & 3 & -4 & 2 \\ & & 1 & -1 & 2 & -2 \\ \hline & 1 & -1 & 2 & -2 & 0 \end{array}$$

$x^3 - x^2 + 2x - 2 = 0$

$x^2(x-1) + 2(x-1) = 0$

$(x^2+2)(x-1) = 0$

$x = \pm i\sqrt{2}, \ x = 1$

$\boxed{x = 1 \text{ mult. } 2, \ -i\sqrt{2}, \ i\sqrt{2}}$

12. Find the domain of x for $\sqrt{\dfrac{x}{x^3 - x^2 - 12x}}$

$\dfrac{x}{x^3 - x^2 - 12x} \geq 0$

$\dfrac{x}{x(x^2 - x - 12)} \geq 0$

$\dfrac{x}{x(x-4)(x+3)} \geq 0$

$\boxed{(0,4) \cup (4, \infty)}$

-3

13. Write the solution to the inequality using interval notation:

$$\frac{3}{x-1} + \frac{2x}{x+1} \geq -1$$

$\dfrac{3(x+1)}{(x-1)(x+1)} + \dfrac{2x(x-1)}{(x-1)(x+1)} + \dfrac{(x-1)(x+1)}{(x-1)(x+1)} \geq 0$

$\dfrac{3x + 3 + 2x^2 - 2x + x^2 - 1}{x^2 - 1} \geq 0$

$\dfrac{3x^2 + x + 2}{x^2 - 1} \geq 0$

$\dfrac{3x^2 + x + 2}{(x-1)(x+1)} \geq 0$

$x = \dfrac{-(1) \pm \sqrt{(-1)^2 - 4(3)(2)}}{2(3)}$

-2

$x = \dfrac{-1 \pm \sqrt{1 - 24}}{6}$

$(-\infty, -1) \cup (1, \infty)$

-5