

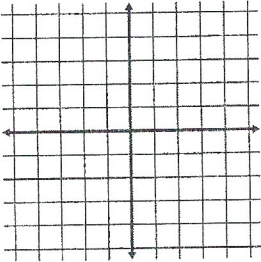
Name \_\_\_\_\_

Period# \_\_\_\_\_

Pre-Calculus: Ch#3 Review

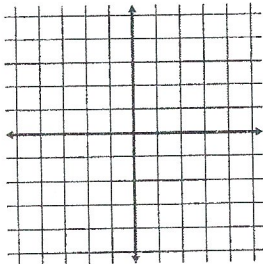
1. Sketch the graph of the function.

$$f(x) = (x+1)(x+4)(x-3)$$



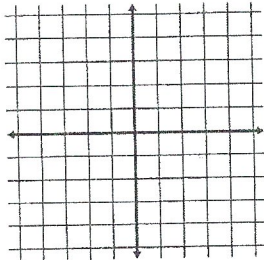
2. Sketch the graph of the function.

$$f(x) = x^2 - x - 6$$



3. Sketch the graph of the function.

$$P(x) = (x-1)^2(x-4)$$



4. Determine the left and right behavior of the graph  $y = 3x^2 + 2x + 1$

- (a) Up to the left, down to the right
- (b) Down to the left, up to the right
- (c) Up to the left, up to the right
- (d) Down to the left, down to the right

5. Find the quotient and remainder of  $(10x^3 + 37x^2 + 37x + 6) \div (5x + 1)$

6. Find the quotient and remainder of

$$\frac{3x^3 - 12x^2 - 9x + 1}{x - 5}$$

7. Find the quotient and remainder of

$$\frac{x^4 + 3x^3 - 7x^2 - 15x + 18}{x + 2}$$

8. Find all the rational zeros of

$$P(x) = x^3 - 7x^2 + 14x - 8$$

9. Find all the rational zeros of

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

Simplify

10.  $(2 - 5i) + (3 + 4i)$

11.  $(-12 + 8i) - (7 + 4i)$

12.  $(3 - 4i)(5 - 12i)$

13.  $\frac{2 - 3i}{1 - 2i}$

14. If  $f(x) = x^3 - 7x^2 + 17x - 15$  has a zero at 3, find the other zeros.

(a)  $-2 \pm 2i$

(b)  $-3, 2$

(c)  $2 \pm i$

(d)  $\frac{2 \pm i}{2}$

15. Simplify  $i^{53}$

(a) 1

(b) -1

(c)  $-i$

(d)  $i$

16. Write in standard form:  $3 - \sqrt{-12}$

(a)  $3 + i\sqrt{3}$

(b)  $3 - 2i\sqrt{3}$

(c)  $7i$

(d)  $3 + 2i\sqrt{3}$

17. Solve:  $x^2 - 2x + 2 = 0$

18. Factor completely:  $x^3 + 5x^2 + x + 5$

(a)  $(x + 5)(x - i)(x - i)$

(b)  $(x - 5)(x + i)(x + i)$

(c)  $(x - 5)(x - i)(x + i)$

(d)  $(x + 5)(x - i)(x + i)$

19. Factor completely:  $x^4 - 16$

20. Which of the following fourth degree polynomial has zeros  $-3, 2, i$ ?

(a)  $x^4 + x^3 + 5x^2 + x + 6$

(b)  $x^4 - x^3 - 5x^2 - x - 6$

(c)  $x^4 - x^3 + 5x^2 - x - 6$

(d)  $x^4 + x^3 - 5x^2 + x - 6$

21. Factor:  $P(x) = x^4 - 2x^3 - 16x^2 + 2x + 15$

(a)  $(x + 1)(x - 1)(x + 3)(x - 5)$

(b)  $(x + 1)(x + 1)(x + 3)(x + 5)$

(c)  $(x + 1)(x - 1)(x - 3)(x - 5)$

(d)  $(x + 1)(x - 1)(x - 3)(x + 5)$

22. Find the intercepts and asymptotes.

$$f(x) = \frac{x^2 - 18x + 81}{x^2 + 6x + 9}$$

(a) Determine the x-intercepts

(b) Determine the y-intercepts

(c) Determine the vertical asymptote

(d) Determine the horizontal asymptote

(e) Hole??

23. Find the intercepts and asymptotes.

$$f(x) = \frac{x^2 - x - 2}{x - 6}$$

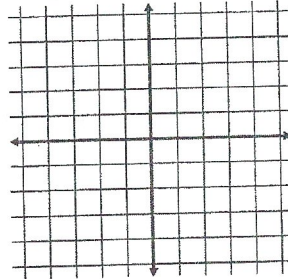
- (a) Determine the x-intercepts
- (b) Determine the y-intercepts
- (c) Determine the vertical asymptote
- (d) Determine the horizontal asymptote
- (e) Hole??

24. Find the intercepts and asymptotes.

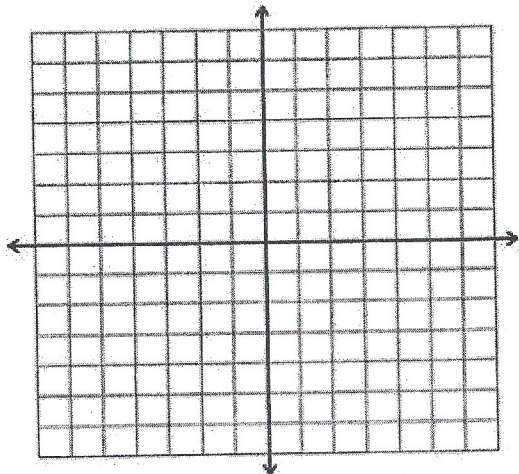
$$f(x) = \frac{x-1}{x+4}$$

- (a) Determine the x-intercepts
- (b) Determine the y-intercepts
- (c) Determine the vertical asymptote
- (d) Determine the horizontal asymptote
- (e) Hole??

(f) Graph



25.  $y = \frac{-2x^2 + 4x + 30}{x^2 + 2x - 3}$




**x-intercepts:**

**y-intercept:**

**vertical asymptotes:**

**horizontal asymptotes:**

**Hole:**

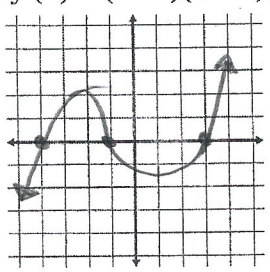
Name Answer Key 

Period# \_\_\_\_\_

Pre-Calculus: Ch#3 Review

1. Sketch the graph of the function.

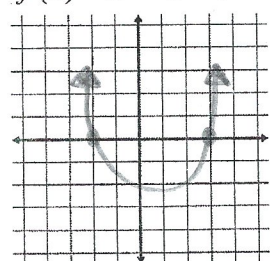
$$f(x) = (x+1)(x+4)(x-3)$$



$X=1$   
 $X=-4$   
 $X=3$

2. Sketch the graph of the function.

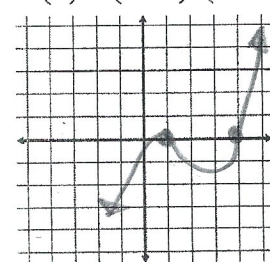
$$f(x) = x^2 - x - 6$$



$X=3$   
 $X=-2$   
 $(x-3)(x+2)=0$

3. Sketch the graph of the function.

$$P(x) = (x-1)^2(x-4)$$



$X=1$  double  
 $X=4$

4. Determine the left and right behavior of the graph  $y = 3x^2 + 2x + 1$

- (a) Up to the left, down to the right
- (b) Down to the left, up to the right
- (c) Up to the left, up to the right
- (d) Down to the left, down to the right



5. Find the quotient and remainder of  $(10x^3 + 37x^2 + 37x + 6) \div (5x + 1)$

$$\begin{array}{r} 5x+1 \overline{) 10x^3 + 37x^2 + 37x + 6} \\ \underline{2x^2 + 17x + 6} \phantom{0} \\ 10x^3 + 37x^2 + 37x + 6 \\ \underline{-10x^3 - 2x^2} \phantom{0} \\ 35x^2 + 37x + 6 \\ \underline{-35x^2 + 17x} \phantom{0} \\ 30x + 6 \\ \underline{-30x + 6} \\ 0 \end{array}$$

6. Find the quotient and remainder of  $\frac{3x^3 - 12x^2 - 9x + 1}{x - 5}$

$$\begin{array}{r} 3x^2 + 3x + 6 + \frac{31}{x-5} \\ 5 \overline{) 3 \phantom{0} - 12 \phantom{0} - 9 \phantom{0} + 1} \\ \underline{15 \phantom{0} - 15 \phantom{0} 30} \\ 3x^2 - 3x \phantom{0} 6 \phantom{0} 31 \\ \underline{-3x^2 + 3x \phantom{0} 6 \phantom{0} 31} \\ 0 \phantom{0} 0 \phantom{0} 0 \phantom{0} 0 \end{array}$$

7. Find the quotient and remainder of  $\frac{x^4 + 3x^3 - 7x^2 - 15x + 18}{x + 2}$

$$\begin{array}{r} x^3 + x^2 - 9x + 3 + \frac{12}{x+2} \\ -2 \overline{) 1 \phantom{0} 3 \phantom{0} - 7 \phantom{0} - 15 \phantom{0} 18} \\ \underline{-2 \phantom{0} - 2 \phantom{0} 10 \phantom{0} - 4} \\ 1x^3 + 1x^2 - 9x + 3 \phantom{0} 12 \\ \underline{-1x^3 - 2x^2 + 9x - 3} \\ 3x^2 - 3x + 6 \phantom{0} 12 \\ \underline{-3x^2 - 6x + 6} \\ 9x + 6 \phantom{0} 12 \\ \underline{-9x - 18} \\ -12 \end{array}$$

8. Find all the rational zeros of  $P(x) = x^3 - 7x^2 + 14x - 8$

$P(x) = x^3 - 7x^2 + 14x - 8$   
 $p = -8$  Factors:  $\pm 1, \pm 2, \pm 4, \pm 8$   
 $q = 1$  Factors:  $\pm 1$   
 $\frac{p}{q} = \pm 1, \pm 2, \pm 4, \pm 8$

$$\begin{array}{r} 1 \phantom{0} - 7 \phantom{0} 14 \phantom{0} - 8 \\ 1 \phantom{0} - 6 \phantom{0} 8 \\ \hline 1x^2 - 6x + 8 = 0 \\ \begin{array}{r} 8 \\ -4 \phantom{0} -2 \\ \hline -6 \end{array} \end{array}$$

$(x-4)(x-2) = 0$   
 $X = 4, 2$

Zeros:  $1, 2, 4$

9. Find all the rational zeros of  $P(x) = x^3 + 4x^2 + 3x - 2$

$P(x) = x^3 + 4x^2 + 3x - 2$   
 $p = -2$  Factors:  $\pm 1, \pm 2$   
 $q = 1$  Factors:  $\pm 1$   
 $\frac{p}{q} = \pm 1, \pm 2$

$$\begin{array}{r} -2 \overline{) 1 \phantom{0} 4 \phantom{0} 3 \phantom{0} - 2} \\ \underline{-2 \phantom{0} - 4 \phantom{0} 2} \\ 1x^2 + 2x - 1 = 0 \\ \begin{array}{r} -1 \\ \hline 2 \end{array} \end{array}$$

Zeros:  $-2, -1 \pm \sqrt{2}$

$$\begin{array}{l} -2 \pm \sqrt{2^2 - 4(1)(-1)} \\ 2(1) \\ -2 \pm \sqrt{4+4} \\ 2 \\ -2 \pm \sqrt{8} \\ 2 \\ -2 \pm 2\sqrt{2} \\ 2 \\ -1 \pm \sqrt{2} \end{array}$$



Simplify

10.  $(2-5i) + (3+4i)$

$5-i$

11.  $(-12+8i) - (7+4i)$

$-19+4i$

12.  $(3-4i)(5-12i)$

$15-36i-20i+48i^2$

$-33-56i$

13.  $\frac{2-3i}{1-2i} (1+2i)$

$\frac{2+4i-3i-6i^2}{1+2i-2i-4i^2}$

$\frac{2+i+6}{1+4} = \frac{8+i}{5}$

$\frac{8+i}{5}$

14. If  $f(x) = x^3 - 7x^2 + 17x - 15$  has a zero at 3,

find the other zeros.

(a)  $-2 \pm 2i$

(b)  $-3, 2$

(c)  $2 \pm i$

(d)  $\frac{2+i}{2}$

$3 \mid \begin{array}{r} 1 \ -7 \ 17 \ -15 \\ 3 \ -12 \ 15 \\ \hline x^2 - 4x + 5 = 0 \end{array}$

$4 \pm \sqrt{4^2 - 4(1)(5)}$

$\frac{4 \pm \sqrt{16-20}}{2}$

$\frac{4 \pm \sqrt{-4}}{2}$

$\frac{4 \pm 2i}{2}$

$2 \pm i$

15. Simplify  $i^{53}$

(a) 1

(b) -1

(c) -i

(d) i

$i^2 = -1$   
 $(i^2)^{26} \cdot i = i$   
 $(i^2)^{26} \cdot i = i$   
 $1 \cdot i = i$

16. Write in standard form:  $3 - \sqrt{-12}$

(a)  $3 + i\sqrt{3}$

(b)  $3 - 2i\sqrt{3}$

(c) 7i

(d)  $3 + 2i\sqrt{3}$

$3 - 2i\sqrt{3}$   
 $\sqrt{4} \sqrt{3}$   
 $2\sqrt{3}$

17. Solve:  $x^2 - 2x + 2 = 0$

$1 \pm i$

$\frac{2 \pm \sqrt{2^2 - 4(1)(2)}}{2(1)}$

$\frac{2 \pm \sqrt{4-8}}{2} = \frac{2 \pm \sqrt{-4}}{2}$

$\frac{2 \pm 2i}{2}$

$1 \pm i$

18. Factor completely:  $x^3 + 5x^2 + x + 5$

(a)  $(x+5)(x-i)(x-i)$

(b)  $(x-5)(x+i)(x+i)$

(c)  $(x-5)(x-i)(x+i)$

(d)  $(x+5)(x-i)(x+i)$

$x^2 \mid \begin{array}{r} x^3 + 5x^2 + x + 5 \\ x+5 \\ \hline x^2 + 5x^2 + x + 5 \\ x+5 \\ \hline x^2 + 1 \end{array}$

$x=i \ x=-i \ x=-5$   
 $(x-i)(x+i)(x+5)$

$(x^2+1)(x+5) = 0$

$x^2+1=0 \Rightarrow x^2 = -1 \Rightarrow x = \pm i$

$x+5=0 \Rightarrow x = -5$

$(x+2)(x-2)(x+2i)(x-2i)$

19. Factor completely:  $x^4 - 16$

$(x^2-4)(x^2+4) = 0$

$x^2-4=0 \Rightarrow x = \pm 2$   
 $x^2+4=0 \Rightarrow x = \pm 2i$

$x = \pm 2 \sqrt{x^2=4} \quad \sqrt{x^2=4} \quad x = \pm 2i$

20. Which of the following fourth degree polynomial has zeros  $-3, 2, i$ ?

(a)  $x^4 + x^3 + 5x^2 + x + 6$

(b)  $x^4 - x^3 - 5x^2 - x - 6$

(c)  $x^4 - x^3 + 5x^2 - x - 6$

(d)  $x^4 + x^3 - 5x^2 + x - 6$

$(x+3)(x-2)(x-i)(x+i)$

FOIL

21. Factor:  $P(x) = x^4 - 2x^3 - 16x^2 + 2x + 15$

(a)  $(x+1)(x-1)(x+3)(x-5)$

(b)  $(x+1)(x+1)(x+3)(x+5)$

(c)  $(x+1)(x-1)(x-3)(x-5)$

(d)  $(x+1)(x-1)(x-3)(x+5)$

FOIL

22. Find the intercepts and asymptotes.

$f(x) = \frac{x^2 - 18x + 81}{x^2 + 6x + 9}$

(a) Determine the x-intercepts

$x-9=0 \Rightarrow x=9$

(b) Determine the y-intercepts

$y = \frac{81}{9} \Rightarrow y=9$

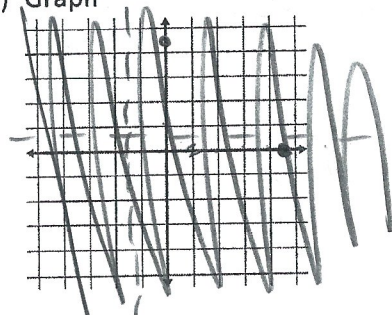
(c) Determine the vertical asymptote

$x+3=0 \Rightarrow x=-3$

(d) Determine the horizontal asymptote

$y = \frac{1x}{1x^2} \Rightarrow y=1$

(e) Graph



23. Find the intercepts and asymptotes.

$$f(x) = \frac{x^2 - x - 2}{x - 6} \frac{(x-2)(x+1)}{(x-6)}$$

(a) Determine the x-intercepts

$$x-2=0 \quad x+1=0$$
$$\boxed{x=2} \quad \boxed{x=-1}$$

(b) Determine the y-intercepts

$$y = \frac{-2}{-6} \quad \boxed{y = \frac{1}{3}}$$

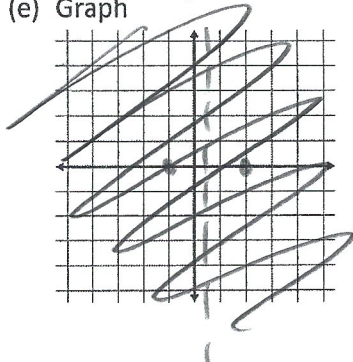
(c) Determine the vertical asymptote

$$x-6=0 \quad \boxed{x=6}$$

(d) Determine the horizontal asymptote

$$y = \frac{1x^2}{0x^2} \text{ none}$$

(e) Graph



f) hole?

24. Find the intercepts and asymptotes.

$$f(x) = \frac{x-1}{x+4}$$

(a) Determine the x-intercepts

$$x-1=0 \quad \boxed{x=1}$$

(b) Determine the y-intercepts

$$\boxed{y = -\frac{1}{4}}$$

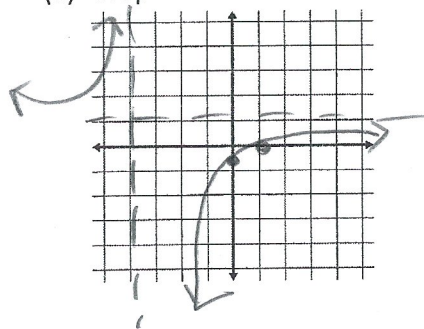
(c) Determine the vertical asymptote

$$x+4=0 \quad \boxed{x=-4}$$

(d) Determine the horizontal asymptote

$$y = \frac{1x}{1x} \quad \boxed{y=1}$$

(e) Graph



The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author details the various methods used to collect and analyze the data. This includes both primary and secondary research techniques. The primary data was gathered through direct observation and interviews with key stakeholders. The secondary data was obtained from publicly available sources and internal company reports.

The analysis of the data revealed several key trends and insights. One major finding was the significant impact of market fluctuations on the overall performance. Another notable trend was the increasing demand for digital services, which has led to a shift in consumer behavior. These findings are discussed in detail in the following sections.

Based on the analysis, several recommendations are provided to address the identified challenges and opportunities. These include implementing more robust data security measures, investing in digital marketing strategies, and improving customer service processes. The author believes that these actions will lead to a more resilient and successful organization.

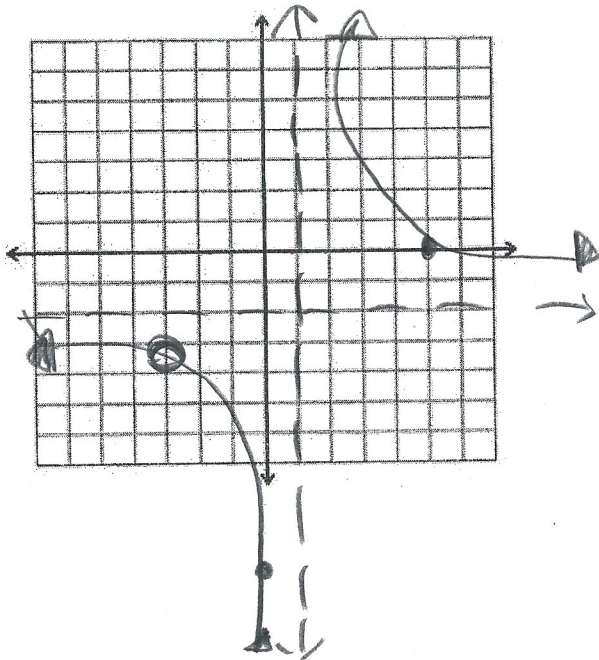
In conclusion, this document provides a comprehensive overview of the research findings and the proposed solutions. It is hoped that these insights will be valuable to the management and help in making informed decisions for the future.



25.  $y = \frac{-2x^2 + 4x + 30}{x^2 + 2x - 3}$

$$\frac{-2(x^2 - 2x - 15)}{x^2 + 2x - 3}$$

$$\begin{array}{r} -15 \\ -5 \quad 3 \\ \hline -2 \end{array}$$



$$\begin{array}{r} -3 \\ 3 \quad -1 \\ \hline 2 \end{array}$$

$$\frac{-2(x-5)(x+3)}{(x+3)(x-1)} \quad \text{hole}$$

x-intercepts:  
top = 0

$$\frac{-2}{-2}(x-5) = \frac{0}{-2}$$

$$x-5=0 \quad \boxed{x=5}$$

vertical asymptotes:

bottom = 0

$$x-1=0$$

$$\boxed{x=1}$$

Hole:  $x+3=0$

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

y-intercept:

let  $x=0$ , solve for  $y$

$$y = \frac{-2(0-5)}{0-1} = \frac{10}{-1} = \boxed{-10}$$

$$y = \frac{-2(x-5)}{x-1}$$

horizontal asymptotes:

highest power

$$y = \frac{-2x}{x}$$

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

$$\frac{-2x+10}{x-1}$$

23. Find the intercepts and asymptotes.

$$f(x) = \frac{x^2 - x - 2}{x - 6}$$

- (a) Determine the x-intercepts
- (b) Determine the y-intercepts
- (c) Determine the vertical asymptote
- (d) Determine the horizontal asymptote
- (e) Hole??

24. Find the intercepts and asymptotes.

$$f(x) = \frac{x - 1}{x + 4}$$

- (a) Determine the x-intercepts
- (b) Determine the y-intercepts
- (c) Determine the vertical asymptote
- (d) Determine the horizontal asymptote
- (e) Hole??

(f) Graph

