Algebra 2 B Name hey ID: 1

# Chapter 5 Test Review

Date _____ Period ____

**Identify the Degree and Leading Coefficient, and Describe the end behavior of each function.**

1) $f(x) = -x^5 + 4x^3 - x + 1$

D: odd 5

Lc: Neg. -1

Up, down

**Find all roots and sketch the graph.**

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

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

$x = \pm\sqrt{3}$ $x = \pm i\sqrt{3}$

mult. 2 mult. 2

**Write a polynomial function in standard form with the given zeros.**

3) 1, 3, −2

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

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

$x^3 - 4x^2 + 3x + 2x^2 - 8x + 6$

$x^3 - 2x^2 - 5x + 6$

4) 2, $\sqrt{6}$, $-\sqrt{6}$

$(x-2)(x-\sqrt{6})(x+\sqrt{6})$

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

$x^3 - 2x^2 - 6x + 12$

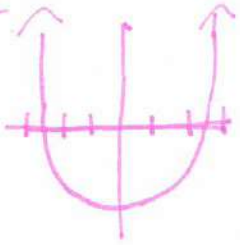
**Find the Zeros of the function. Sketch the general shape of each function.State the multiplicity of multiple zeros and whether they cross or touch the axis.**

5) $f(x) = x^2 + 2x - 1$ up up

$x = \frac{-2 \pm \sqrt{4 - 4(-1)}}{2} = \frac{-2 \pm \sqrt{8}}{2}$

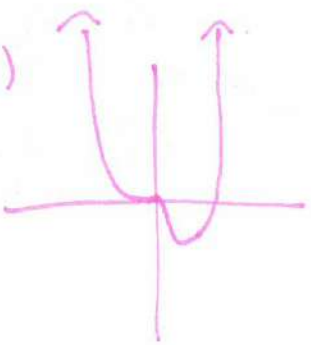
$x = \frac{-2 \pm 2\sqrt{2}}{2}$

$x = -1 \pm \sqrt{2}$



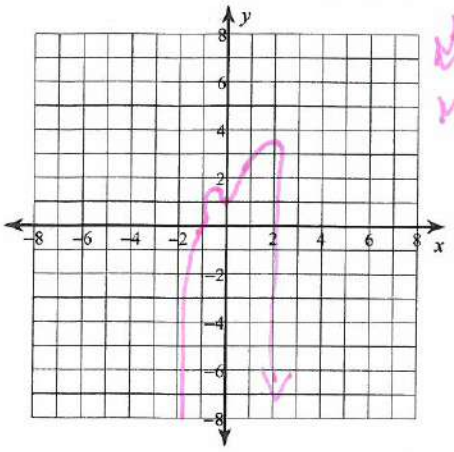
6) $f(x) = x^4 - x^2 - x$

$x(x^3 - x - 1)$



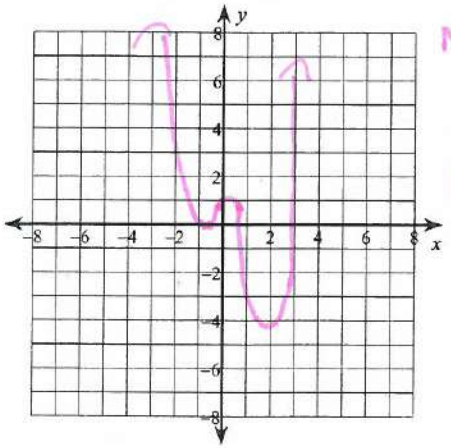
**Sketch the graph of each function. Approximate the relative minima and relative maxima to the nearest tenth.**

7) $f(x) = -x^4 + x^3 + 2x^2 + 1$



Min: (0, 1)
Max: (-.7, 1.4)
(1.4, 3.8)

8) $f(x) = x^4 - x^3 - 3x^2 + 1$



Min: (-.9, 0)
(1.7, -4.2)
Max: (0, 1)

**Find all roots by factoring.**

9) $x^3 - 8 = 0$

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

$x = 2$

$x = \frac{-2 \pm \sqrt{4-16}}{2}$

$x = \frac{-2 \pm 2i\sqrt{3}}{2}$

$x = -1 \pm i\sqrt{3}$

10) $4x^4 - 25 = 0$

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

$x = -\sqrt{5}/2 \quad x = \sqrt{5}/2$

$x = \pm i\sqrt{5}/2 \quad x = \pm\sqrt{5}/2$

**State if the given binomial is a factor of the given polynomial. Then find all remaining factors.**

11) $(6x^3 + 21x^2 - 39x + 34) \div (x + 5)$

| | 6 | 21 | -39 | 34 |
|---|---|---|---|---|
| -5 | ↓ | -30 | 45 | -30 |
| | 6 | -9 | 6 | 4 |

Not a factor

**State the possible rational zeros for each function. Then find all rational zeros.**

12) $f(x) = 5x^3 + x^2 - 5x - 1$

c: $\pm 1$

Lc: $\pm 1, \pm 5$

PRZ: $\pm 1, \pm \frac{1}{5}$

Zeros: $1, -1, -\frac{1}{5}$

13) $f(x) = 2x^3 + 3x^2 - 1$

c: $\pm 1$

Lc: $\pm 1, \pm 2$

PRZ: $\pm 1, \pm \frac{1}{2}$

Zeros: $-1, \frac{1}{2},$

**Use Decartes' Rule of Signs to tell about the number of real positive, real negative, and imaginary roots of the function.**

14) $f(x) = 5x^5 + 10x^4 + 28x^3 + 56x^2 + 15x + 30$

$-5x^5 + 10x^4 - 28x^3 + 56x^2 - 15x + 30$

| P | N | I | T |
|---|---|---|---|
| 0 | 5 | 0 | 5 |
| 0 | 3 | 2 | 5 |
| 0 | 1 | 4 | 5 |

15) $f(x) = 5x^5 - 25x^4 + 46x^3 - 230x^2 + 48x - 240$

| P | N | I | T |
|---|---|---|---|
| 5 | 0 | 0 | 5 |
| 3 | 0 | 2 | 5 |
| 1 | 0 | 4 | 5 |

**Find all zeros. Please include a list of the possible rational zeros, Decartes' Rule of Signs, and any other work necessary to find the roots.**

16) $f(x) = 3x^5 + 9x^4 - 2x^3 - 6x^2 - 5x - 15$

PRZ: $\pm 1, 3, 5, 15, \frac{1}{3}, \frac{5}{3},$

$x = -3, x = \pm i, x = \pm\sqrt{\frac{5}{3}}$

| P | N | I | T |
|---|---|---|---|
| 1 | 4 | 0 | 5 |
| *1 | 2 | 2 | 5 |
| 1 | 0 | 4 | 5 |

| | 3 | 9 | -2 | -6 | -5 | -15 |
|---|---|---|---|---|---|---|
| -3 | ↓ | -9 | 0 | 6 | 0 | 15 |
| | 3 | 0 | -2 | 0 | -5 | 0 ✓ |

$3x^4 - 2x^2 - 5 = 0$

$3x^4 + 3x^2 - 5x^2 - 5$

$3x^2(x^2+1) - 5(x^2+1)$

$(x^2+1)(3x^2-5)$

17) $f(x) = 2x^6 - 5x^4 - 50x^2 + 125$

PRZ: $\pm 1, 5, 25, 125, \frac{1}{2}$
$5/2, \frac{25}{2}, \frac{125}{2}$

| P | N | I | T |
|---|---|---|---|
| 2 | 0 | 4 | 6 |
| 0 | 2 | 4 | 6 |
| *2 | 2 | 2 | 6 |
| 0 | 0 | 6 | 6 |

$x^4(2x^2-5) - 25(2x^2-5)$

$(2x^2-5)(x^4-25)$

$(2x^2-5)(x^2+5)(x^2-5)$

$x = \pm\sqrt{5/2}$ $x = \pm i\sqrt{5}$ $x = \pm\sqrt{5}$

**SHOW WORK BESIDE EACH PROBLEM!!! NO CREDIT FOR A CIRCLED ANSWER, EVEN IF IT IS CORRECT!!**

14. What is the number of real roots of this equation?

$$(x^4 + 1)(x - \sqrt{3}) = 0$$

A. 1
B. 2
C. 4
D. 5

Work For problem....

14. $x^4 + 1 = 0$ $\quad x - \sqrt{3} = 0$

1 $\quad x = \sqrt{3}$

15. What is the nature of the zeros of the polynomial $f(x) = 2x^3 - x^2 - 18x + 9$ ?

A. 3 real rational
B. 3 real, 1 rational and 2 irrational
C. 1 real rational, 2 nonreal complex
D. 1 real irrational, 2 nonreal complex

15.

| P | N | I | T |
|---|---|---|---|
| *2 | 1 | 0 | 3 |
| 0 | 1 | 2 | 3 |

16. How many rational zeros does this polynomial function have?

$$f(x) = (x^4 - 16)(3x^2 - 21)(4x^2 + 1)$$

A. 8
B. 6
C. 4
D. 2

16. $(x^2+4)(x^2-4)$ $(4x^2+1)$ $3(x^2-7)=0$

I I $\quad (x+2)(x-2)$ $\quad x^2 - 7 = 0$

$x = 2 \quad x = -2$ $\quad x^2 = 7$

$x = \pm\sqrt{7}$

17. What are the rational zeros for $x^3 - 3x^2 - 4x + 12$ ?

A. −2, 2, 3
B. −2, 2, −3
C. 1, 2, 3, 4, 6, 12
D. ±1, ±2, ±3, ±4, ±6, ±12

17. p: $\pm 1, 2, 3, 4, 6, 12$

q: $\pm 1$

zeros: $-2, 2, 3$

18. Given the polynomial function $f(x) = ax^3 - acx^2 - bx^2 + bcx$, where $a$, $b$, and $c$ are nonzero numbers, find all zeros.

A. $x = 0, \frac{b}{a}, c$
B. $x = 0, \frac{a}{c}, b$
C. $x = 0, \frac{a}{b}, c$
D. $x = 0, \frac{b}{c}, a$

18. $a\left(\frac{b^3}{a^3}\right) - ac\left(\frac{b^2}{a^2}\right) - b\left(\frac{b^2}{a^2}\right) + bc\left(\frac{b}{a}\right)$

$= \frac{ab^3}{a^3} - \frac{acb^2}{a^2} - \frac{b^3}{a^2} + \frac{b^2c}{a}$

$= \frac{b^3}{a^2} - \frac{cb^2}{a} - \frac{b^3}{a^2} + \frac{cb^2}{a} = 0$

19. Which of the following lists best describes the five complex zeros of the function $2x^5 + 3x^4 + 11x^3 + 24x^2 - 63x - 27$ ?

A. Three rational, two nonreal
B. Two rational, one irrational, two nonreal
C. One rational, two irrational, two nonreal
D. One rational triple root, two irrational

19.

| P | N | I | T |
|---|---|---|---|
| 1 | 4 | 0 | 5 |
| *1 | 2 | 2 | 5 |
| 1 | 0 | 4 | 5 |