Precalculus
Review 2.1-2.5 Homework

Non-Calc

Name Key

1) Find the vertex of the parabola:

$y = 4(x+6)^2 - 7$

Vertex $(-6, -7)$

2) Find the vertex of the parabola:

$f(x) = x^2 - 6x + 72$

$x = \frac{6}{2(1)} = \frac{6}{2} = 3$

vertex: $(3, 63)$

$f(3) = 3^2 - 6(3) + 72$

$= 9 - 18 + 72 = 63$

3) Find the x and y-intercepts of the parabola:

$f(x) = x^2 - 6x - 72$

y int $f(0) = 0^2 - 6(0) - 72 = -72$ $(0, -72)$

x int $(x-12)(x+6) = 0$

$x = 12$ $x = -6$

$(12, 0)$ $(-6, 0)$

4) Write an equation in vertex form for the parabola with vertex at (-4,1) and containing the point (5, -2)

h k x y

$y = a(x-h)^2 + k$

$-2 = a(5+4)^2 + 1$

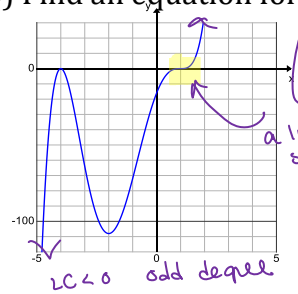
$-2 = 81a + 1$

$-3 = 81a$

$a = -3/81$

$y = -\frac{3}{81}(x+4)^2 + 1$

5) Find an equation for the polynomial shown.



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

a little sass.

$LC < 0$ odd degree

6) Write a linear equation if f(-2) = 4 and f(3) = -6

$(-2, 4)$ $(3, -6)$

$m = \frac{-6-4}{3+2} = \frac{-10}{5} = -2$

$y - 4 = -2(x+2)$

$y - 4 = -2x - 4$

$y = -2x$

Describe the end behavior of the equation using limits.

7) $f(x) = 7x^7 - 6x^4 + 5x^3 - 2x + 1$

↑ ↓

$\lim_{x \to \infty} f(x) = \infty$

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

8) $f(x) = -5x^4 + 3x^2 - 3x + 4$

↓ ↓

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

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

9) Draw the shape of the graph and find zeros, degree, leading coefficient, and y-intercept:

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

$-5x^5$

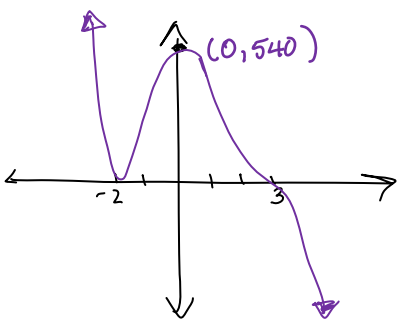
↑ ↓

zeros

$x = 3$ $x = -2$

$f(0) = -5(-3)^3(2)^2$

$= 540$



can skip!

10) Divide using long division: $\frac{5x^4+3x^3-x^2+2x-6}{x^2+4}$

$5x^2+3x-2$ | x^2+0x+4 | $5x^4+3x^3-x^2+2x-6$

$-(5x^4+0x^3+20x^2)$

$3x^3-21x^2+2x$

$-(3x^3+0x^2+12x)$

$-21x^2-10x-6$

$-(-21x^2+0x-84)$

$-10x+78$

$5x^2+3x-2+\frac{-10x+78}{x^2+4}$

11) Use the remainder theorem to find f(-4) if $f(x)=-2x^3+3x^2-5x+7$

-4	-2	3	-5	7
		8	-44	196
	-2	11	-49	203

$f(-4)=203$

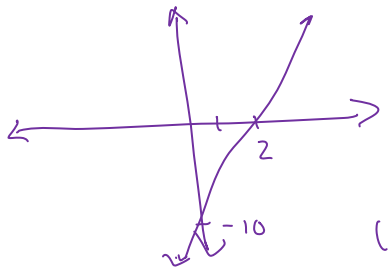
12) The following are zeros of a cubic polynomial: 2 and 1+2i

a. List all the zeros: 2, 1+2i, 1-2i (Be sure to add any missing complex zeros.)

b. Write in Factored Form: $(x-2)(x-1-2i)(x-1+2i)=0$

c. X-intercepts (Real Zeros): $x=2$ Y-intercept: -10

d. Graph:



$(-2)(-1-2i)(-1+2i)$

$-2(1-4i^2)$

$-2(5)=-10$

$(x-2)(x^2-2x+5)=0$ → $x^3-2x^2+5x-2x^2+4x-10$

e. Write in Standard Form: $x^3-4x^2+9x-10=0$

Calculator

13) Completely factor the polynomial and find all zeros (exact answers, no decimals!):

f(x) = $x^3+4x^2-7x-28$ $x=-4$

-4	1	4	-7	-28
		-4	0	28
	1	0	-7	0

$x^2-7=0$

$x=\pm\sqrt{7}$

$(x+4)(x-\sqrt{7})(x+\sqrt{7})=0$

$f(x)=3x^3-x^2-13x-5$

$-\frac{5}{3}$	3	-1	-13	-5
		-5	10	5
	3	-6	-3	0
	$\frac{3}{3}$	$\frac{-6}{3}$	$\frac{-3}{3}$	

$x=-\frac{5}{3}$ $x=1\pm\sqrt{2}$

$(3x-5)(x-1-\sqrt{2})(x-1+\sqrt{2})=0$

$1\quad -2\quad -1$

$x^2-2x-1=0$

$x=\frac{2\pm\sqrt{4-4(1)(-1)}}{2}=\frac{2\pm2\sqrt{2}}{2}=1\pm\sqrt{2}$

14) If a basketball is thrown straight up into the air with an initial velocity of 30 ft/sec from an initial height of 5 feet, will it hit a 20 foot high ceiling? Justify your answer. When will the ball hit the ground (assuming no ceiling impedes its path)? Use the equation: $h(t) = -16t^2 + v_0 t + s_0$

$h(t) = -16t^2 + 30t + 5$

vertex: $(.937, 19.063)$

the highest the ball will not hit the ceiling.

find the zero

$t \approx 2.03$ seconds when the ball will hit the ground.

15) Find all the zeros and completely factor. $g(x) = 2x^4 - 3x^3 + 7x^2 + 7x - 5$

Rational zeros

$x = -1 \quad x = 1/2$

	2	-3	7	7	-5
-1		-2	5	-12	5
	2	-5	12	-5	0
1/2		1	-2	5	
	2	-4	10	0	
	2/2	-4/2	10/2		
	1	-2	5		

cubic

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

$x = \frac{2 \pm \sqrt{4 - 4(1)(5)}}{2}$

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

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

$= 1 \pm 2i$

$x = -1 \quad x = 1/2 \quad x = 1+2i \quad x = 1-2i$

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

A {quick} refresh of topics that COULD be included on the Chapter 2.1, 2.3-2.5 Quest

2.1: Linear and Quadratic Functions
- Equations of Lines (Pt.-Slope and Slope-Int. Forms)
- Equations of Parabolas (Standard and Vertex Forms)
- Linear and Quadratic Modeling

2.3: Polynomials
- Graphing Polynomials (no calculator)
- Zeros, Multiplicity
- Y-Intercept
- End Behavior with Limits

2.4: Real Zeros of Polynomials
- Long Division
- Synthetic Division
- Synthetic Substitution/Remainder Theorem
- Factor Theorem
- Finding the real zeros by calculator and synthetic division

2.5: Complex Zeros/Fundamental Theorem of Algebra
- Finding all zeros of a polynomial and writing in factored form
- Complex Conjugate Zeros
- Finding a polynomial from given zeros

P6: Complex Numbers
- Not specifically tested, but included in 2.5 questions