Precalculus
Chapter 2.5 – 2.9 Review

Name: KEY
Block: _____

NO CALCULATOR

For questions 1 – 3, find the following:

a) **All asymptotes (horizontal, vertical, and slant), if they exist.**
b) **All intercepts (*x* and *y*), if they exist.**
c) **Holes, if they exist.**
d) **The graph of each function … plot at least 3 points per region.**

1. $y = \dfrac{2x+3}{x-1}$

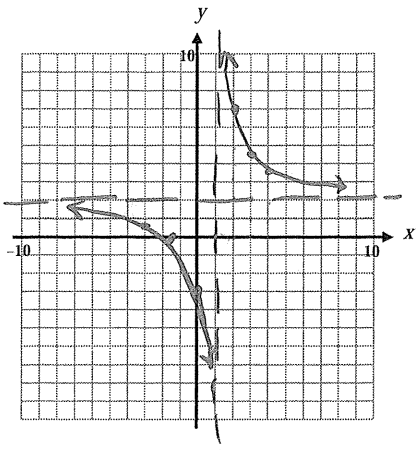
VA $x = 1$

HA $y = 2$

x-int: $0 = 2x+3$

$-\frac{3}{2} = x$

y-int: $y = \frac{0+3}{0-1} = -3$

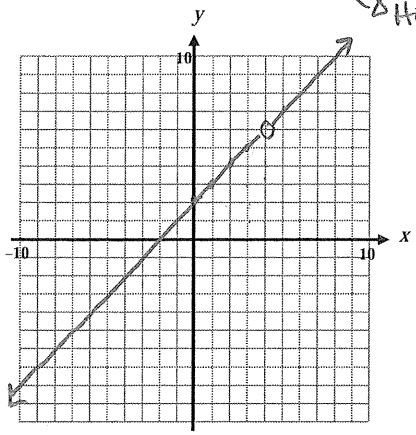


x	y
-3	.75
2	7
3	4.5
4	3.7

2. $y = \dfrac{x^2-2x-8}{x-4} = \dfrac{(x-4)(x+2)}{x-4} = x+2$

Hole @ $x=4$

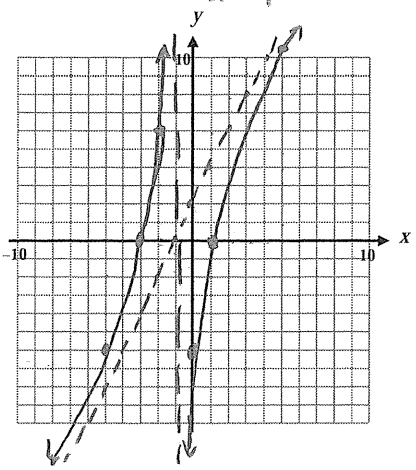
$(4,6)$



The remaining function is $y = x+2$

No Asymptotes! Just a line with a Hole.

3. $y = \dfrac{2x^2+4x-6}{x+1} = \dfrac{2(x^2+2x-3)}{x+1} = \dfrac{2(x+3)(x-1)}{x+1}$



VA: $x = -1$

No H.A.

find SLANT... $-1 \mid 2 \quad 4 \quad -6$; $-2 \quad -2$; $2 \quad 2 \quad -8$

SA $y = 2x+2$

x-int: $(-3,0)$ & $(1,0)$

y-int: $y = \frac{0+0-6}{0+1} = -6$

x	y
-2	6
-5	-6
5	$10\frac{2}{3}$

4. Solve the following equation: $x^2 - 6x + 13 = 0$

$x = \dfrac{6 \pm \sqrt{(6)^2 - 4(1)(13)}}{2(1)} = \dfrac{6 \pm \sqrt{36-52}}{2} = \dfrac{6 \pm \sqrt{-16}}{2}$

$= \dfrac{6 \pm 4i}{2}$

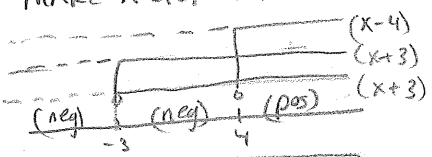
$= \dfrac{6}{2} \pm \dfrac{4i}{2}$

$= 3 \pm 2i$

Algebraically solve each inequality.

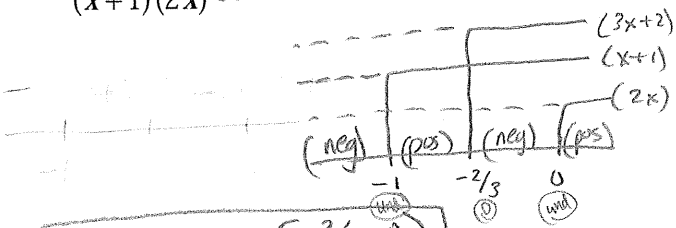
5. $(x-4)(x+3)^2 < 0$ → (neg)

MAKE A SIGN CHART



$(-\infty, -3) \cup (-3, 4)$

6. $\dfrac{3x+2}{(x+1)(2x)} \leq 0$ → neg or 0



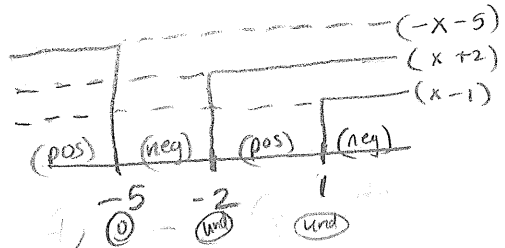
$(-\infty, -1) \cup [-\frac{2}{3}, 0)$

7. $\dfrac{1}{x+2} - \dfrac{2}{x-1} > 0$ pos

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

$\dfrac{x-1-2x-4}{(x+2)(x-1)} > 0$

$\dfrac{-x-5}{(x+2)(x-1)} > 0$



$(-\infty, -5) \cup (-2, 1)$

8. [Chapter P Review] Simplify: $\dfrac{m^3(3a)^{-4}}{m^{-7}a^{-3}} = \dfrac{m^3 m^7 a^3}{(3a)^4} = \dfrac{m^{10}a^3}{81a^4} = \dfrac{m^{10}}{81a}$

MUST DO THIS!!

9. [Chapter P Review] Solve the following equation: $4|2x-3|-9>15$

$4|2x-3| > 24$

$|2x-3| > 6$

$2x-3 < -6$ OR $2x-3 > 6$

$2x < -3$ $\qquad 2x > 9$

$x < -\frac{3}{2}$ OR $x > \frac{9}{2}$

$(-\infty, -\frac{3}{2}) \cup (\frac{9}{2}, \infty)$

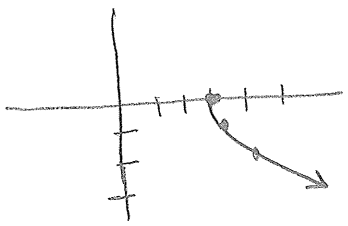
10. [Chapter 1 Review] Graph the following equation. Identify at least 3 points on the graph. $y = -\sqrt{3x-9}$
Describe the transformation.

$y = -\sqrt{3(x-3)}$

↳ Don't forget this part

$(x, y) \to (\frac{x}{3} + 3, -y)$

$(0,0) \to$	$(3, 0)$
$(1,0) \to$	$(3\frac{1}{3}, -1)$
$(4,2) \to$	$(4\frac{1}{3}, -2)$



CALCULATOR ALLOWED

11. Given: $g(x) = x^4 - 2x^3 + 13x^2 - 32x - 48$.

(a) Use graphing, synthetic division and the quadratic formula to find all zeros.

Answer the question:

Go zeros look like $x = -1$ & $x = 3$

-1	1	-2	13	-32	-48
		-1	3	-16	48
	1	-3	16	-48	0
3		3	0	48	
	1	0	16	0	

$x^2 + 16 = 0$

$x^2 = -16$

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

$x = \pm 4i$

zeros: $x = -1$, $x = 3$, $x = 4i$, $x = -4i$

(b) Write the factorization of $g(x)$ as a product of linear factors and irreducible quadratic factors.

$g(x) = (x+1)(x-3)(x^2+16)$

12. Write an equation for the quadratic function with a vertex of (–3, 4) and containing point (–5, –8)

$y = a(x+3)^2 + 4$

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

$-8 = 4a + 4$

$-12 = 4a$

$-3 = a$

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

13. Find a polynomial of degree 3 with roots –4, and $5 - i$. Express the answer in standard form.

$5+i$ also!

$y = (x+4)(x-(5-i))(x-(5+i))$

$y = (x+4)[x-5+i][x-5-i]$

$y = (x+4)[(x-5)+i][(x-5)-i]$

$y = (x+4)[(x-5)^2 + 1]$

$y = (x+4)(x^2 - 10x + 25 + 1)$

$y = (x+4)(x^2 - 10x + 26)$

$y = x^3 - 10x^2 + 26x + 4x^2 - 40x + 104$

$y = x^3 - 6x^2 - 14x + 104$

14. Perform the indicated operation.

(a) $(3 - 4i) - (-8 + 2i)$

$3 - 4i + 8 - 2i$

$11 - 6i$

(b) $\dfrac{3+i}{2-3i}$ (express the answer in $a + bi$ form)

$\dfrac{(3+i)(2+3i)}{(2-3i)(2+3i)} = \dfrac{6 + 9i + 2i + 3i^2}{4+9} = \dfrac{3 + 11i}{13} = \dfrac{3}{13} + \dfrac{11}{13}i$ (-3)

15. [Review Chapter 2a] Find the cubic regression equation (without rounding ANYTHING) for the following data. Let $x = 0$ be the year 1970. Use your equation to predict the number of employees in the year 2004.

$x = 34$

L_1	Year	~~1972~~ 2	~~1975~~ 3	~~1978~~ 8	~~1980~~ 10	~~1983~~ 13	~~1986~~ 16
L_2	Number of Employees	247	475	658	546	493	605

Find cubic reg

PASTE into Y_1 ... VARS, 5: Statistics, EQ, 1: RegEq

$y = -.834001187\,3x^3 - 25.87126589x^2 + 248.1148133x - 167.6765039$

BACK TO MAIN SCREEN

VARS, Y-VARS, Function, 1: Y_1 ⇒ Plug in 34 ... $Y_1(34) \approx 11,141$ employees