Note that this document contains review problems worked in both morning and afternoon classes, which were purposely different so that you have more problems to work from when you are studying.

Math Lab will be open Sunday, Monday, Tueday, and Wednesday.

You can still bring up your Khan Academy homework grades for all chapters.

If your final exam is better than your 2nd lowest test grade, I will replace your 2nd lowest test grade with your final exam percentage.

Homework:

Please make sure each section is labeled, sections are organized in numerical order, stapled, and your first and last names are clearly labeled at the top of the first page.

5.1 #63-85 odd
5.2 #3-7odd, 15-25odd, 35-49odd
5.3 #25-29odd, 43-51odd, 61-67odd, 89-97odd, 109-117odd
5.4 #19-25 odd; 27-43 odd; 55-61 odd
5.5 #21-47 odd, 79-137odd
5.6 #3-131 odd
5.7 #35-49 odd; 51-57 odd; 61-75 odd

Ch 5 Review/Test/Cumulative Review
6.1 #39-79 odd
6.2 #3-95 odd
6.3 #17, 23, 25, 33, 41, 43
6.4 #19, 25, 29, 31
6.6 # 5-25 odd

7.1 #85-113 odd; 39-73 odd; 125-149 odd
7.2 #11-21 odd; #43-51odd; 57-65odd;85-91 odd; 97-103odd; 113-121odd
8.2 #59-69odd

16. Divide the polynomials. Give the quotient and the remainder. Test #3

$(4x^3 + 2x^2 - 5x - 3) \div (x + 2)$

$-2 \mid 4 \quad 2 \quad -5 \quad -3$

$\qquad\quad -8 \quad 12 \quad -14$

$4 \quad -6 \quad 7 \mid -17$

x^3 ↑ x^2-coeff ↑ x-coeff ↑ const ↑ remainder

Quotient: $4x^2 - 6x + 7$

Remainder: -17

17. Completely factor the polynomial.

$64x^3 - 27 = (4x)^3 - 3^3$

$a^3 - b^3 = (a-b)(a^2+ab+b^2)$

$= (4x-3)(16x^2 + 12x + 9)$

$3(-12) = -36$

$= 9(-4)$

18. Completely factor the polynomial.

$6x^5 + 10x^4 - 24x^3 = 2x^3(3x^2 + 5x - 12)$

$= 2x^3[3x^2 + 9x - 4x - 12]$

$= 2x^3[3x(x+3) - 4(x+3)]$

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

16. Divide the polynomials. Give the quotient and the remainder.

$(4x^3 + 2x^2 - 5x - 3) \div (x + 2)$

Quotient: $4x^2 - 6x + 7$

Remainder: -17

Significance of this answer:

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

$(x+2)(4x^2 - 6x + 7) - 17$

19. Solve the system of equations. If it exists, give your solution as an ordered pair (x, y). Test #3

$\begin{cases} 3x - 3y = 4 \\ 2x - 4y = 2 \end{cases}$ $\cdot -2$, $\cdot 3$ $\Rightarrow$ $-6x + 6y = -8$, $+\ 6x - 12y = 6$

$-6y = -2$

$\frac{-6y}{-6} = \frac{-2}{-6}$

$y = \frac{1}{3}$

$3x - 3\left(\frac{1}{3}\right) = 4$

$3x - 1 = 4$

$3x = 5$

$x = 5/3$

$\left(\frac{5}{3}, \frac{1}{3}\right)$

20. Solve the equation for x.

$(x-1)^2 = 31 - x$

$(a-b)^2 = (a-b)(a-b) = a^2 - 2ab + b^2$

$x^2 - 2x + 1 = 31 - x$

$x^2 - x - 30 = 0$

$(x+5)(x-6) = 0$

$x+5=0$, $x-6=0$

$x = -5$; $x = 6$

Bonus A: Find the equation of the line that passes through the points $(-4, 7)$ and $(-4, -3)$.

(x_1, y_1) (x_2, y_2)

slope $= m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3-7}{-4-(-4)} = \frac{-10}{0}$ undefined slope (no slope) $\Rightarrow$ vertical line

$x = -4$

21. Find the distance between the two points $(-8, -2), (-1, -5)$. Test #2

x_1, y_1 x_2, y_2

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(-1-(-8))^2 + (-5-(-2))^2} = \sqrt{7^2 + (-3)^2} = \sqrt{49+9}$

$= \sqrt{58}$

22. Find the midpoint of the line segment connecting the two points $(-8, -2), (-1, -5)$.

x_1, y_1 x_2, y_2

$(x_m, y_m) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= \left(\frac{-8+(-1)}{2}, \frac{-2+(-5)}{2}\right) = \left(\frac{-9}{2}, \frac{-7}{2}\right)$

24. Find the equation of the line with zero slope that passes through the point $(-8, -2)$.

$\Rightarrow$ horizontal

$y = -2$

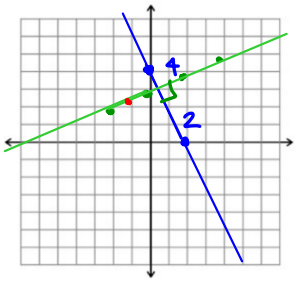
Find the x- and y-intercepts of the function $6x + 3y = 12$. Test #2

26. x-intercept:
$6x+3(0)=12$
$6x=12$
$x=2$
$(2,0)$

27. y-intercept:
$6(0)+3y=12$
$3y=12$ $y=4$
$(0,4)$

28. Graph the function $6x + 3y = 12$.

(answer to this problem graphed in blue;
the perpendicular in #29 is graphed in green)



29. Find the equation of a line perpendicular to the line $6x + 3y = 12$ that passes through the point $(-1,2)$.

$3y = -6x + 12$
$y = -2x + 4$
slope: -2

slope of perpendicular line $= \frac{1}{2} = m$; $(x_1, y_1) = (-1,2)$

Point-slope equation:
$y - y_1 = m(x - x_1)$
$y - 2 = \frac{1}{2}(x - (-1))$
$y - 2 = \frac{1}{2}(x + 1)$
$y - 2 = \frac{1}{2}x + \frac{1}{2}$
$y = \frac{1}{2}x + \frac{1}{2} + \frac{2}{1}$
$y = \frac{1}{2}x + \frac{1}{2} + \frac{4}{2}$
$y = \frac{1}{2}x + \frac{5}{2}$
graph in green

30. Solve the equation $-5 - [4(x - 2) - 3(2x - 1)] = 2x$ Test #2

$-5 - [4x - 8 - 6x + 3] = 2x$
$-5 - [-2x - 5] = 2x$
$-5 + 2x + 5 = 2x$
$0 = 0$

Result is an identity (equation that is always true)

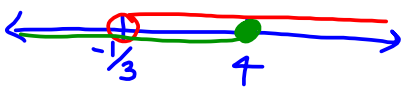
solution set: all real #'s = $\mathbb{R}$
$(-\infty, \infty)$

32. Solve the compound inequality. Give your answer in interval notation.

$5 - 3x < 6$ *or* $4x - 9 \leq 7$

$\cup$ union of solution sets

$-3x < 1$ $\quad 4x \leq 16$
$x > -\frac{1}{3}$ $\quad x \leq 4$



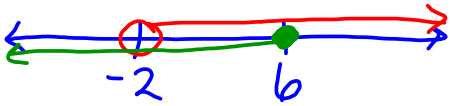
$(-\infty, \infty)$

32. Solve the compound inequality. Give your answer in interval notation.

$3 - 2x < 7$ *and* $3x - 12 \leq 6$

$\cap$ intersection of solution sets

$-2x < 4$ $\quad 3x \leq 18$
$x > -2$ $\quad x \leq 6$



$(-2, 6]$

38. List the values that must be excluded from the domain using the roster method. Test #2

$f(x) = \dfrac{(x-7)(x+9)}{(x+3)(x-8)}$

$\{-3, 8\}$

39. State the domain of the function using interval notation.

$f(x) = \dfrac{x+7}{x+9}$ domain: all real #'s except -9

$(-\infty, -9) \cup (-9, \infty)$

40. List the range of the function using the roster method, where the domain is restricted to $\{-1,0,1\}$.

$f(x) = \dfrac{\sqrt{1+x}}{2-x}$ range = output of the domain

$f(-1) = \dfrac{\sqrt{1+(-1)}}{2-(-1)} = 0$ $f(1) = \dfrac{\sqrt{1+1}}{2-1} = \dfrac{\sqrt{2}}{1} = \sqrt{2}$

$f(0) = \dfrac{\sqrt{1+0}}{2-0} = \dfrac{1}{2}$

$\{0, \frac{1}{2}, \sqrt{2}\}$

5. Simplify and state the values which are not in the domain for each variable. Test #4

$$\frac{\frac{3}{x} - \frac{2}{x-2}}{\frac{2}{x} + \frac{5}{x-2}} = \frac{\frac{3(x-2)}{x(x-2)} - \frac{2x}{x(x-2)}}{\frac{2(x-2)}{x(x-2)} + \frac{5x}{x(x-2)}} = \frac{\frac{3x-6-2x}{x(x-2)}}{\frac{2x-4+5x}{x(x-2)}}$$

$$= \frac{x-6}{\cancel{x(x-2)}} \cdot \frac{\cancel{x(x-2)}}{7x-4}$$

$$= \frac{x-6}{7x-4}, x \neq \frac{4}{7}, 0, 2$$

$\dfrac{\frac{a}{b}}{\frac{c}{d}} = \dfrac{a}{b} \cdot \dfrac{d}{c}$

6. Simplify.

$\sqrt[3]{54x^4} = \sqrt[3]{3^3 \cdot 2 \cdot x^3 \cdot x}$

$9 \cdot 6$
$3 \cdot 3 \cdot 3 \cdot 2$

$= 3x\sqrt[3]{2x}$

$\dfrac{a}{b} \div \dfrac{c}{d}$

$\sqrt[3]{8} = 2$ bc $2^3 = 8$

7. Solve for x. Check your solutions. Test #4

$$\frac{3}{x+5}=\frac{5}{x+2}-\frac{9}{x^2+7x+10}$$

$(x+5)(x+2)$

$$\frac{(x+5)(x+2)}{1}\cdot\frac{3}{x+5}=\frac{(x+5)(x+2)}{1}\cdot\frac{5}{x+2}-\frac{9}{1}$$

$$\frac{3(x+2)}{(x+5)(x+2)}=\frac{5(x+5)}{(x+2)(x+5)}-\frac{9}{(x+5)(x+2)}$$

$$\frac{3x+6}{(x+5)(x+2)}=\frac{5x+25-9}{(x+5)(x+2)}$$

$c\cdot a=b\cdot c$

$$\frac{(x+5)(x+2)}{1}\cdot\frac{3x+6}{(x+5)(x+2)}=\frac{5x+16}{(x+5)(x+2)}\cdot\frac{(x+5)(x+2)}{1}$$

$$(3x+6)(x+5)(x+2)=(5x+16)(x+5)(x+2)$$

$$3x+6=5x+16$$

$$6-16=5x-3x$$

$$-10=2x$$

$$-5=x$$

no solution

3. Multiply or divide and simplify. State the values which are not in the domain for each variable.

$$\frac{2x^2+8x+8}{x^2+9x+14}\div\frac{x^2-25}{x^2+2x-35}$$

$$=\frac{2(x^2+4x+4)}{x^2+9x+14}\div\frac{(x-5)(x+5)}{(x+7)(x-5)}$$

$$=\frac{2(x+2)(x+2)}{(x+2)(x+7)}\cdot\frac{(x+7)(x-5)}{(x-5)(x+5)}$$

$$=\frac{2(x+2)}{x+5},\ x\neq -2,-7,5,-5$$

4. Subtract and simplify. State the values which are not in the domain for each variable. Test #4

$$\frac{2x-1}{x-4}-\frac{x^2-10x-7}{x^2+x-20}$$

$(x+5)(x-4)$

$$\frac{(2x-1)(x+5)}{(x-4)(x+5)}-\frac{x^2-10x-7}{(x-4)(x+5)}=\frac{2x^2+10x-x-5-x^2+10x+7}{(x-4)(x+5)}$$

$$=\frac{x^2+19x+2}{(x-4)(x+5)},\ x\neq 4,-5$$

8. Solve for a.

$$\frac{1}{b}=\frac{1}{x}-\frac{1}{a}$$

$(x+20)(x-1)$

$x^2-x+20x-20$

Solve for x.

$xyz = 3(x+y)$

$xyz = 3x + 3y$

$-3x \quad -3x$

$xyz - 3x = 3y$

$\frac{x(yz-3)}{yz-3} = \frac{3y}{yz-3}$

$x = \frac{3y}{yz-3}$

$\frac{x \cdot a}{a} = \frac{b}{a}$

$x = \frac{b}{a}$

9. Simplify. Test #4

$\sqrt{24x^3y^2} = \sqrt{4 \cdot 6 x^3 y^2}$

$= \sqrt{2^2 \cdot 6 \cdot x^2 \cdot x \cdot y^2} = |2xy|\sqrt{6x}$

$= 2|xy|\sqrt{6x}$

10. Simplify.

$\left(\frac{4}{25}\right)^{3/2} = \sqrt{\left(\frac{4}{25}\right)^3} = \left(\sqrt{\frac{4}{25}}\right)^3 = \left(\frac{\sqrt{4}}{\sqrt{25}}\right)^3$

$= \left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$

Test #1

24. How much water must be evaporated from 40 gallons of 12% fruit juice in order to obtain 15% fruit juice?

type of liquid	volume of liquid	% concentration juice	total volume of pure juice content
12% juice	40 gal	0.12	40 (0.12)
water	x	0	0
15% juice	40-x	0.15	(40-x)(0.15)

$40(0.12) - 0 = (40-x)(0.15)$

$4.8 = 6 - 0.15x$

$0.15x = 6 - 4.8$

$0.15x = 1.2$

$x = \frac{1.2}{0.15} = \frac{120}{15} = \frac{40}{5} =$ **8 gal**

23. Two airplanes are 2550 miles apart and traveling toward each other. One plane is traveling 150 miles per hour faster than the other plane. The planes meet in 3 hours. Find the speed of each plane.

Test #1

II. Translate the verbal expression into a variable expression in terms of a single variable. Do not simplify.

21. The total of twelve times a number and three less than the number.

$12x + x - 3$

22. Twice the difference between four more than twice a number and one more than the number.

$2(4+2x-(1+x))$

16. Subtract. Write your answer as a single, simplified fraction, and state the values of the variable for which the expression is undefined.

$$\frac{2}{x}-\frac{1}{x+1} = \frac{2(x+1)}{x(x+1)} - \frac{1\cdot x}{x(x+1)}$$

$$= \frac{2x+2-x}{x(x+1)} = \boxed{\frac{x+2}{x(x+1)},\ x\neq 0,-1}$$

17. Simplify.

$$\sqrt[2]{64x^6y^{16}}$$

$$\sqrt{8^2(x^3)^2(y^8)^2}$$

$$|8x^3y^8| = \boxed{8|x^3|y^8}$$

18. Simplify.

$$\sqrt[3]{64x^6y^{15}} = \sqrt[3]{4^3(x^2)^3(y^5)^3}$$

$$= \boxed{4x^2y^5}$$

19. Divide. Write your answer as a single, simplified fraction, and state the values of the variable for which the expression is undefined.

$$\frac{(x+3)(x-4)}{(x+4)(x-5)} \div \frac{(x+3)(x-5)}{(x+4)(x-4)}$$

$$= \frac{(x+3)(x-4)}{(x+4)(x-5)} \cdot \frac{(x+4)(x-4)}{(x+3)(x-5)}$$

$$= \boxed{\frac{(x-4)^2}{(x-5)^2},\ x\neq -4,-3,5,4}$$

21. Solve for x.

$$\left(\frac{3}{x+5}+\frac{4}{(x+5)(x+3)}=\frac{2}{x+3}\right)\cdot\frac{(x+5)(x+3)}{1}$$

$$\frac{3(x+3)}{(x+5)(x+3)} + \frac{4}{(x+5)(x+3)} = \frac{2(x+5)}{(x+3)(x+5)}$$

$$\frac{3x+9+4}{(x+5)(x+3)} = \frac{2x+10}{(x+3)(x+5)}$$

$$\frac{(x+3)(x+3)}{1}\cdot\frac{3x+13}{(x+5)(x+3)} = \frac{2x+10}{(x+3)(x+5)}\cdot\frac{(x+3)(x+5)}{1}$$

$$(3x+13)(x+3)(x+5) = (2x+10)(x+5)(x+3)$$

$$3x+13 = 2x+10$$

$$3x-2x = 10-13$$

$$x = -3$$

$\Rightarrow$ **no solution**

21. Solve for x.

$$\left(\frac{3}{x+5}+\frac{4}{(x+5)(x+3)}=\frac{2}{x+3}\right)\cdot\frac{(x+5)(x+3)}{1}$$

$$\frac{3}{x+5}\cdot\frac{(x+5)(x+3)}{1}+\frac{4}{(x+5)(x+3)}\cdot\frac{(x+5)(x+3)}{1}=\frac{2}{x+3}\cdot\frac{(x+5)(x+3)}{1}$$

$$3(x+3)+4=2(x+5)$$

22. Rewrite as a radical expression. Do not simplify the radical.

$(32xy^2)^{3/5}$

$$\sqrt[5]{(32xy^2)^3} \quad \text{or} \quad \left(\sqrt[5]{32xy^2}\right)^3$$

23. Rewrite as an exponential expression. Simplify the expression.

$\sqrt[3]{9^{3/2}x^{-6}y^{-9}z^{15}}$ $\frac{15}{1}\cdot\frac{1}{3}=5$ $\sqrt[3]{x}=x^{1/3}$ $\frac{3}{2}\cdot\frac{1}{3}=\frac{1}{2}$

$$\left(9^{3/2}x^{-6}y^{-9}z^{15}\right)^{1/3}=9^{1/2}x^{-2}y^{-3}z^{5}$$

$9^{1/2}=\sqrt{9}=3$

$$=\frac{3z^5}{x^2y^3}$$

24. Solve for x.

$xyz=3(x+y)$

$$xyz=3x+3y$$

$$-3x \quad -3x$$

$$xyz-3x=3y$$

$$x(yz-3)=3y$$

$$\frac{x(yz-3)}{yz-3}=\frac{3y}{yz-3}$$

$$x=\frac{3y}{yz-3}$$

$$\frac{3y}{y}=\frac{xyz}{y}$$

$$3=xz$$

$$\frac{3y}{xy}=\frac{xyz}{xy}$$

Test #1

Write a linear (single variable) equation to describe the word problem. Do not solve.

23. Find three consecutive odd integers such that twice the difference between the first and third is 19 less than the second.

24. 50 pounds of delicious Jamaican Blue Mountain coffee that costs $28 per pound are mixed with Fakin' Blue Discount Coffee that costs $4 per pound. How much Fakin' Blue is needed to make a coffee blend that costs $15 per pound?

Test #1

VI. Given the sets A, B, and C (and all the usual sets listed on the first page), determine the following unions, intersections, and relative complements. Give the answer in the simplest form possible.

$$A = \{1, 2, 3, 4, 5\}, B = \left\{-2, -1, \frac{1}{2}, \frac{5}{6}, 3, 5, 6\right\}, C = \{-\sqrt{5}, \pi\}$$

29. $A \cup \mathbb{N}$

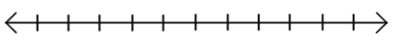
30. $C \cap \mathbb{Q}$

31. $A - B$

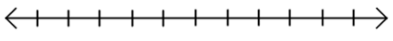
32. $B \cup \mathbb{R}$

VIII. Graph the compound inequality on the number line, and give the solution in your choice of notation.

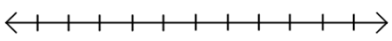
35. $x < 3$ *or* $x \geq -5$



36. $x > 4$ *or* $x \leq -2$



37. $x < 2$ *and* $x \geq -3$



38. $x > 1$ *and* $x \leq -4$