Topics in College Algebra Practice Final

#1-4 Solve each compound inequality. Graph the solution and write the solution set using interval notation.

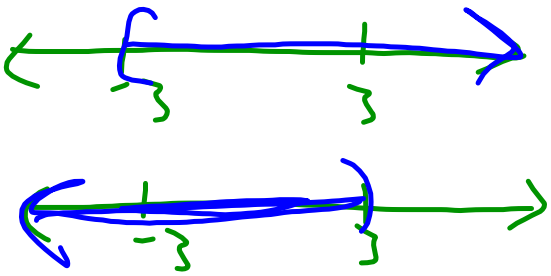
1. $3x + 2 \geq -7$ and $4x - 7 < 5$

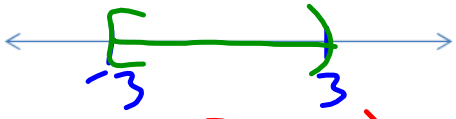
$-2 \quad -2$ $\qquad$ $+7 \quad +7$

$3x \geq -9$ $\qquad$ $4x < 12$

$\frac{3}{3} \quad \frac{3}{3}$ $\qquad$ $\frac{4}{4} \quad \frac{12}{4}$

$x \geq -3$ $\qquad$ $x < 3$



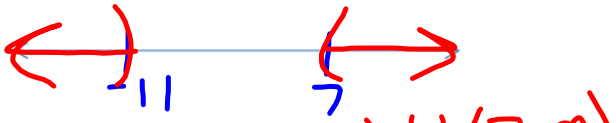


Interval Notation $[-3, 3)$

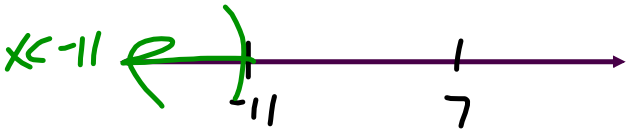
2. $3x > 21$ or $2x<-22$

$\div 3 \quad \div 3 \quad \div 2 \quad \div 2$

$x>7 \quad x<-11$



Interval Notation $(-\infty, -11) \cup (7, \infty)$



3. $|x+3|<12$

$x+3<12$ and $x+3>12$

$-3 \quad -3 \qquad -3 \quad -3$

$x<9$ and $x>-15$

Interval Notation $(-15, 9)$

4. $|3x-6|>-18$

Interval Notation $(-\infty, \infty)$

Solve.

5. $|x+4|=12$

{8, -16}

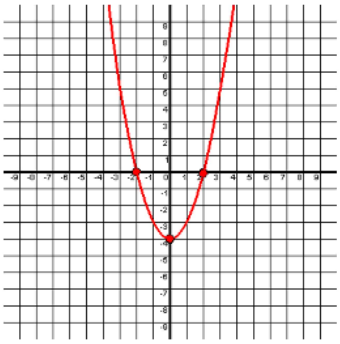
$x+4=12$ $x+4=-12$

$-4 \quad -4$ $-4 \quad -4$

$x=8$ $x=-16$

Find the domain and range of the relation in interval notation and determine whether it is a function.

6.



Domain $(-\infty, \infty)$

Range $[-4, \infty)$

Function: (YES) or No

Given $f(x)=3x-7$ and $g(x)=9x+14$ find the following

7. $f+g$ $12x+7$

$(3x-7)+(9x+14)$

8. $f-g$ $-6x-21$

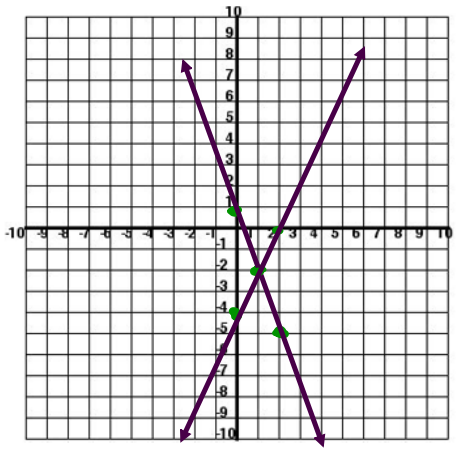
$(3x-7)+(-9x+14)$

Solve by graphing.

9. $y = -3x + 1$ $m=-3, b=1$

$y = 2x - 4$ $m=2, b=-4$

$(1, -2)$



Solve using substitution.

10. $x = -3y$
$2x - 5y = 44$

$(12, -4)$

$2(-3y) - 5y = 44$

$-6y - 5y = 44$

$\frac{-11y}{-11} = \frac{44}{-11}$

$y = -4$

$x = -3(-4)$

$x = 12$

Solve using elimination.

11. $3x+2y=-7$
$5x-2y=-1$

$8x=-8$
$x=-1$

$(-1,-2)$

$3(-1)+2y=-7$
$-3+2y=-7$
$+3 \quad +3$
$2y=-4$
$y=-2$

12. $7x - 4y = 4$
$5x + y = 26$

4(5x + y = 26)

$7x - 4y = 4$
$20x + 4y = 104$

$27x = 108$
$\frac{27}{27} \quad \frac{27}{27}$
$x = 4$

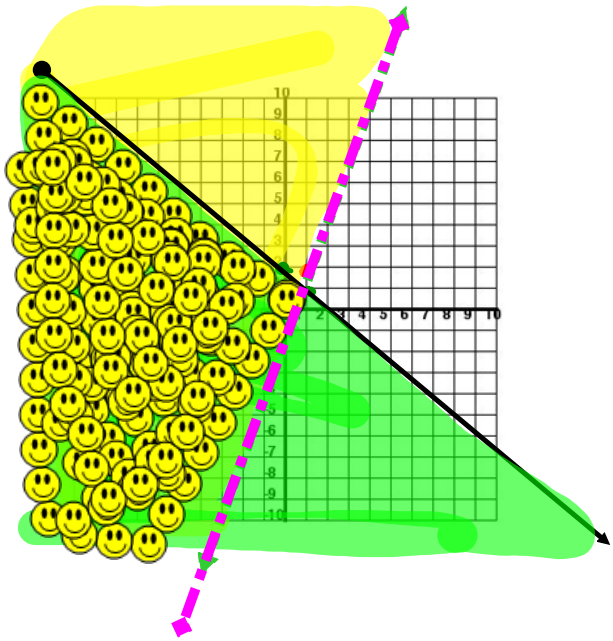
(4, 6)

$5(4) + y = 26$
$20 + y = 26$
$-20 \quad -20$
$y = 6$

Graph the solution set for the system of inequalities.

13. $y > 3x - 1$
$y \leq -x + 2$

$m = 3, b = -1$
$m = -1, b = 2$



Test (0,0)

$0 > 3(0) - 1$
$0 > -1$
True

Test (0,0)

$0 \leq 0 + 2$
$0 \leq 2$
True

14. Evaluate $\sqrt{64}$ 8

15. Evaluate $\sqrt[3]{-125}$ -5

16. Evaluate $36^{\frac{1}{2}}$

6

$\sqrt{36} = 6$

17. Evaluate $8^{\frac{2}{3}}$

4

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

$2^2 = 4$

18. Write in exponential form $\sqrt[4]{x^3}$ $x^{\frac{3}{4}}$

For problems 19-21, use the rules of exponents to simplify.

19. $x^{\frac{2}{7}} \bullet x^{\frac{3}{7}}$

$x^{\frac{5}{7}}$

$\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$

20. $\dfrac{x^{\frac{7}{9}}}{x^{\frac{1}{2}}}$

$\frac{7}{9} - \frac{1}{2}$

$\frac{14}{18} - \frac{9}{18} = \frac{5}{18}$

$x^{\frac{5}{18}}$

21. $\left(x^{\frac{3}{4}}\right)^{\frac{4}{7}}$

$x^{\frac{12}{28}} = x^{\frac{3}{7}}$

$\frac{3}{4} \cdot \frac{4}{7} = \frac{12}{28} = \frac{3}{7}$

$x^{\frac{3}{7}}$

For problems 22-25 simplify.

22. $\sqrt{60}$

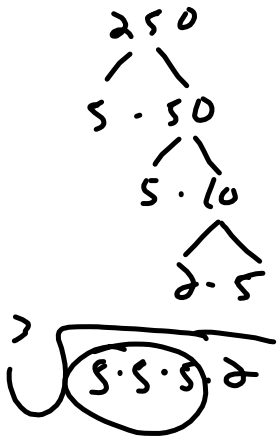
$\sqrt{4} \cdot \sqrt{15}$

$2\sqrt{15}$

$2\sqrt{15}$

23. $\sqrt[3]{250}$

$5\sqrt[3]{2}$



$5\sqrt[3]{2}$

24. $\sqrt{6} \bullet \sqrt{15}$

$3\sqrt{10}$

$\sqrt{90} = \sqrt{9}\sqrt{10}$

$3\sqrt{10}$

$8\sqrt{2}$

25. $\sqrt{18}+\sqrt{50}$

$\sqrt{9}\sqrt{2}+\sqrt{25}\sqrt{2}$

$3\sqrt{2}+5\sqrt{2}=8\sqrt{2}$

For problems 26-27 solve, check your answers.

26. $\sqrt{x+2}=8$

$(\sqrt{x+2})^2=(8)^2$

$x+2=64$

$-2 \quad -2$

$x=62$

62

27. $\sqrt[3]{x+2}-1=2$

$+1\ +1$

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

$\left(\sqrt[3]{x+2}\right)^3=3^3$

$x+2=27$

$-2\ \ -2$

$x=25$

25

Add

28. $(5+2i)+(3-11i)$

8-9i

8-9i

Multiply

29. $(6-3i)(9+i)$

$57-21i$

$54+6i-27i-3i^2$

$54+6i-27i+3$

$57-21i$

Divide.

30. $\frac{5}{i}$ $\cdot \frac{i}{i}$ $-5i$

$\frac{5i}{i^2}$ $\frac{5i}{-1} = -5i$

31. $\frac{4}{3+i}$ $\cdot \frac{3-i}{3-i}$

$\frac{12-4i}{9-i^2}$

$\frac{12-4i}{9+1}$

$\frac{12-4i}{10}$

$\frac{12}{10} - \frac{4i}{10}$

$\frac{6}{5} - \frac{2i}{5}$

$\frac{\frac{6}{5} - \frac{2i}{5}}{\quad}$

Find the power of i

32. i^{15} $= i^{12} \cdot i^{3}$ $-i$ ______________________

$1 \cdot -i = -i$

Solve. Use any method.

33. $x^2+7x+12=0$

$a=1, b=7$
$c=12$

$\{-3,-4\}$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$x=\frac{-7\pm\sqrt{7^2-4(1)(12)}}{2(1)}$$

$$=\frac{-7\pm\sqrt{49-48}}{2}$$

$$=\frac{-7\pm\sqrt{1}}{2}$$

$$=\frac{-7\pm1}{2}$$

$$x=\frac{-7+1}{2}=\frac{-6}{2}=-3$$

$$x=\frac{-7-1}{2}=\frac{-8}{2}=-4$$