

Honors Precalculus
Summer Work 2012.13

The completion of these problems is optional. However, you will be expected to know how to do these problems on the first day of class and you may be assessed on them.

Look at these examples before doing problem #1 (\Leftrightarrow means 'is equivalent to'):

$$-2 < x \leq 7 \Leftrightarrow (-2, 7]$$



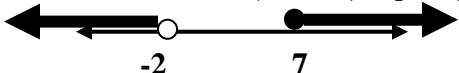
$$x < 7 \Leftrightarrow (-\infty, 7)$$



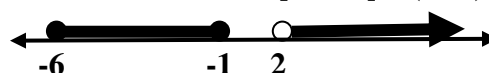
$$x \geq -2 \Leftrightarrow [-2, \infty)$$



$$x < -2 \text{ or } x \geq 7 \Leftrightarrow (-\infty, -2) \cup [7, \infty)$$



$$x \geq -6 \text{ and } x \leq -1 \text{ or } x > 2 \Leftrightarrow [-6, -1] \cup (2, \infty)$$



1) Express each inequality using interval notation (using parentheses and brackets), and then graph when possible:

a. $x > -30$

b. $-3 \leq x \leq 8$

c. $x > 2 \text{ or } x \leq -5$

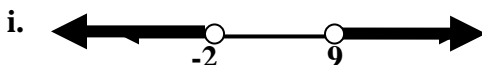
d. $x > -12 \text{ and } x \leq 25$

e. $x < -20 \text{ or } -2 < x < 17$

f. $5 < x \leq 12 \text{ or } x \geq 20$

g. You must be between the ages of 18 and 30 to enlist in the Army.

h. The machine cuts pencils to be $8 \pm .02$ millimeters in diameter.



2) Graph each interval and rewrite as an inequality.

a. $(-\infty, 12)$

b. $[-13, \infty)$

c. $[-22, 35]$

d. $(-\infty, -7) \cup (6, 30)$

e. $[-5, -2] \cup [3, 4)$

f. $(-\infty, -2] \cup [1, +\infty)$

3) Solve for x, expressing your answer using interval notation.

a. $\frac{x}{2} + 5 \leq 1$

b. $2x - 7x > 3(2x + 9)$

c. $\frac{2x}{5} - \frac{3x}{2} \geq 10$

d. $-3|x - 2| = -15$

e. $|4x| - 7 > -5$

f. $-3|2x - 1| + 9 \leq 0$

4) Answer the following for the points A(2,8) and B(-4,-7).

a. Find an equation of the line AB algebraically using the point-slope formula. Now re-state your equation so it is written in both slope-intercept form and standard form.

b. Find x, when $y = 3$ algebraically.

c. Find y, when $x = -2$ algebraically.

d. What is the slope of any line parallel to line AB? Find an equation of the line parallel to line AB through the point (2,4)

e. What is the slope of any line perpendicular to line AB? Find an equation of the line perpendicular to line AB through the point (5,-3).

f. Find the distance from point A to point B.

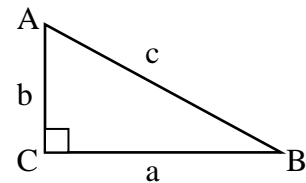
g. Find the midpoint between point A and B.

5) Solve each right triangle:

a. $\angle A = 60^\circ$
 $a = 12$

b. $\angle B = 45^\circ$
 $b = 16$

c. $\angle A = 50^\circ$
 $c = 15$



6) Solve each system of equations:

a. $\begin{cases} 4x + 3y = 31 \\ y = 2x + 7 \end{cases}$

b. $\begin{cases} 2x = 4y \\ x + y = 9 \end{cases}$

c. $\begin{cases} -2x + 3y = 8 \\ x - y = -3 \end{cases}$

d. $\begin{cases} 2x + 3y = -2 \\ 5x - 4y = 18 \end{cases}$

e. $\begin{cases} x^2 + 2y = 14 \\ 3x + 4y = 1 \end{cases}$

f. $\begin{cases} x^2 + y^2 = 4 \\ y = x^2 - 2 \end{cases}$

7) Factor the following completely:

a. $6x^2 + 17xy + 5y^2$

b. $25x^2 - 144$

c. $216x^3 - 125$

8) Write in vertex form:

a. $y = x^2 - 8x + 1$

b. $y = 3x^2 + 12x - 4$

9) Find all solutions of each equation:

a. $9x^2 + 12x + 4 = 0$

b. $9x^4 + 14x^2 - 8 = 0$

c. $9x^2 = 49$

d. $x^2 - 4x + 10 = 0$

e. $x^2 = 9x - 4$

f. $2x^2 - 4x = 5$

g. $(x+2)^{\frac{3}{4}} = 27$

h. $2x^5 - 18x^3 + 40x = 0$

i. $3x^3 - 2x^2 - 24x + 16 = 0$

10) Graph each of the following:

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

b. $y = -2x^2 - 16x - 13$

c. $y - 2 = (x-3)^2$

d. $y = 2x + 7$

e. $4x + 3y = 12$

f. $y = (2x+7)(x-4)(x+5)(3x-2)$

11) Evaluate each function for the given values: $f(x) = 4x^2 - 2x + 10$ $g(x) = \frac{3x+7}{x-8}$

a. $f(4)$

b. $f(-3)$

c. $f\left(\frac{1}{2}\right)$

d. $f(x-3)$

e. $g(3)$

f. $g(-4)$

g. $g\left(-\frac{7}{3}\right)$

h. $g(-3x)$

12) Simplify/solve without a calculator:

a. $\left(\frac{1}{8}\right)^{\frac{1}{3}}$

b. $16^{\frac{3}{4}}$

c. $32^{\frac{2}{5}}$

d. $\log_2 16$

e. $\log_{27} \sqrt{3}$

f. $\log_{\sqrt{5}} \left(\frac{1}{9}\right)$

g. $\log_x \left(\frac{1}{100}\right) = -2$

h. $\log_{\frac{1}{3}} x = 4$

i. $2^{2x-1} = \left(\frac{1}{4}\right)^{x+2}$

ANSWERS:

1. a) $(-30, \infty)$ b) $[-3, 8]$ c) $(-\infty, -5] \cup (2, \infty)$ d) $(-12, 25]$
e) $(-\infty, -20) \cup (-2, 17)$ f) $(5, 12] \cup [20, \infty)$ g) $[18, 30]$
h) $[7.98, 8.02]$ i) $(-\infty, -2) \cup (9, \infty)$ j) $[-25, 18)$
2. a) $x < 12$ b) $x \geq -13$ c) $-22 \leq x \leq 35$
d) $x < -7$ or $6 < x < 30$ e) $-5 \leq x \leq -2$ or $3 \leq x < 4$ f) $x \leq -2$ or $x \geq 1$
3. a) $(-\infty, -8]$ b) $\left(-\infty, -\frac{27}{11}\right)$ c) $\left(-\infty, -\frac{100}{11}\right]$
d) $x \in \{-3, 7\}$ e) $\left(-\infty, -\frac{1}{2}\right) \cup \left(\frac{1}{2}, \infty\right)$ f) $(-\infty, -1] \cup [2, \infty)$
4. a) $y - 8 = \frac{5}{2}(x - 2)$ or $y + 7 = \frac{5}{2}(x + 4)$; $y = \frac{5}{2}x + 3$; $5x - 2y = -6$ b) $x = 0$
c) $y = -2$ d) $y - 4 = \frac{5}{2}(x - 2)$ e) $y + 3 = -\frac{2}{5}(x - 5)$ f) $\sqrt{261} \approx 16.155$ g) $\left(-1, \frac{1}{2}\right)$
5. a) $\angle B = 30^\circ$; $b = 4\sqrt{3}$; $c = 8\sqrt{3}$ b) $\angle A = 45^\circ$; $a = 16$; $c = 16\sqrt{2}$
c) $\angle B = 40^\circ$; $b = 9.642$; $c = 11.491$
6. a) $(1, 9)$ b) $(6, 3)$ c) $(-1, 2)$
d) $(2, -2)$ e) $\left(\frac{9}{2}, -\frac{25}{8}\right) \cap \left(-3, \frac{5}{2}\right)$ f) $(-2, 0) \cap (1, \pm\sqrt{3})$
7. a) $(3x + y)(2x + 5y)$ b) $(5x + 12)(5x - 12)$ c) $(6x - 5)(36x^2 + 30x + 25)$
8. a) $y + 15 = (x - 4)^2$ b) $y + 16 = 3(x + 2)^2$
9. a) $-\frac{2}{3}$ b) $\pm\frac{2}{3}, \pm i\sqrt{2}$ c) $\pm\frac{7}{3}$ d) $2 \pm i\sqrt{6}$ e) $\frac{9 \pm \sqrt{65}}{2}$
f) $\frac{2 \pm \sqrt{14}}{2}$ g) 79 h) $0, \pm 2, \pm\sqrt{5}$ i) $\frac{2}{3}, \pm 2\sqrt{2}$
10. a) **Vertex** $(1, -9)$; **y-intercept** $(0, -8)$; **x-intercept** $(4, 0)$ & $(-2, 0)$
b) **Vertex** $(-4, 19)$; **y-intercept** $(0, -13)$
c) **Vertex** $(3, 2)$; **y-intercept** $(0, 11)$; **x-intercept** – none
d) **Vertex** – none; **y-intercept** $(0, 7)$; **x-intercept** $\left(-\frac{7}{2}, 0\right)$
e) **Vertex** – none; **y-intercept** $(0, 4)$; **x-intercept** $(3, 0)$
f) **y-intercept** $(0, 280)$; **x-intercepts** $(4, 0), \left(\frac{2}{3}, 0\right), \left(-\frac{7}{2}, 0\right),$ & $(-5, 0)$
11. a) 66 b) 52 c) 10 d) $4x^2 - 26x + 12$
e) $-\frac{16}{5}$ f) $\frac{5}{12}$ g) 0 h) $\frac{9x - 7}{3x + 8}$
12. a) $\frac{1}{2}$ b) 8 c) 4 d) 4 e) $\frac{1}{9}$ f) -4 g) 10 h) $\frac{1}{81}$ i) $-\frac{3}{4}$