Name: Key

Exam 2

Directions: (1) Answer each problem completely, show your algebra (you need not show your arithmetic), and box your final answer. (2) No notes, no textbooks, no communication devices, no discussion. (3) You may use an ACT-approved calculator.

100 points. 50 minutes. Math 107-12/18, Fall 2014 (Dr. Daniel Brice)

1. [5 points] Solve $5(x-3)-6(x-4)=-5$ for x.
   (a) 11 (b) 12 (c) 13 (d) 14 (e) 15 (f) None of these.

2. [5 points] Solve $A=\frac{(a+b)h}{2}$ for h.
   (a) $h=\frac{a+b}{2A}$ (b) $h=\frac{2A}{a+b}$ (c) $h=-\frac{a+b}{2A}$ (d) $h=-\frac{2A}{a+b}$ (e) h is undefined.
   (f) None of these.

3. [5 points] Solve $x=x^2-12$ for x. Which is the solution set?
   (a) $\{-3,4\}$ (b) $\{-4,3\}$ (c) $\{3\}$ (d) $\{4\}$ (e) $\emptyset$ (f) None of these.

4. [5 points] Solve $x^2-4x+5=0$ for x. Which is the solution set?
   (a) $\emptyset$ (b) $\{-4,-1\}$ (c) $\{1,4\}$ (d) $\{-2-i,-2+i\}$ (e) $\{2-i,2+i\}$ (f) None of these.

5. [5 points] Solve $x^3=2x^2$ for x. Which is the solution set?
   (a) $\{-2\}$ (b) $\{2\}$ (c) $\{-2,0\}$ (d) $\{0,2\}$ (e) $\emptyset$ (f) None of these.

6. [5 points] Solve $2\sqrt{1+x}-1=5$ for x. Which is the solution set?
   (a) $\{0\}$ (b) $\{-3\}$ (c) $\{3\}$ (d) $\{0,-3\}$ (e) $\{0,3\}$ (f) None of these.

7. [5 points] Solve $4(x-4)>3(x-5)$. Which is the solution set?
   (a) $(1,\infty)$ (b) $[1,\infty)$ (c) $(-\infty,1)$ (d) $(-\infty,1]$ (e) $\emptyset$ (f) None of these.

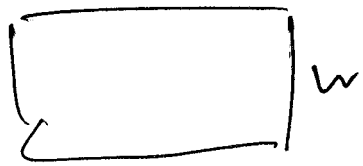
8. [5 points] Solve $|2-5x|=3$ for x. Which is the solution set?
   (a) $\{-1,5\}$ (b) $\{-5,1\}$ (c) $\{-1/5,1\}$ (d) $\{-1,1/5\}$ (e) $\emptyset$ (f) None of these.

9. [5 points] Find the distance between $(0,3)$ and $(-4,0)$.
   (a) 1 (b) 7 (c) $\sqrt{7}$ (d) 5 (e) $\sqrt{5}$ (f) None of these.

10. [5 points] In which quadrant is the midpoint between $(0,3)$ and $(-4,0)$?
    (a) Quadrant I (b) Quadrant II (c) Quadrant III (d) Quadrant IV (e) It is on one of the axes. (f) None of these.

11. [10 points] A farmer has 1320 feet of fencing that he will use to enclose a rectangular pasture. He wants the length of the pasture to be twice as long as the width. Find the width.

Perim = 1320



$l = 2w$

$1320 = 2l + 2w$

$1320 = 2(2w) + 2w$

$1320 = 6w$

$220 = w$

12. [10 points] Solve $\frac{1}{x-1} + \frac{x}{x+3} = \frac{4}{(x-1)(x+3)}$ for x.

LCD: $(x-1)(x+3)$

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

$1(x+3) + x(x-1) = 4$

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

$x^2 = 1$

$x = \pm 1$

$x = -1$

check $x=1$: $\frac{1}{1-1} + \frac{*}{1+3} = \frac{4}{(1-1)(1+3)}$ undefined! $x \neq 1$

check $x=-1$: $\frac{1}{-1-1} + \frac{-1}{-1+3} = \frac{4}{(-1-1)(-1+3)}$ ✓

13. [10 points] Solve $|5 - 2x| > 3$. Graph the solution set, and write the solution set in interval notation.

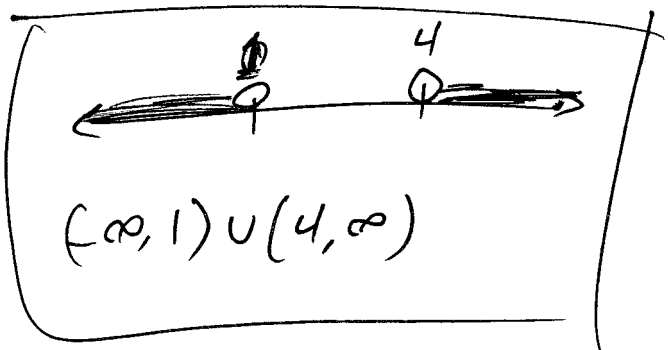
$|5 - 2x| > 3$

$5 - 2x > 3$ or $5 - 2x < -3$

$-5 \quad -5$ $\quad -5 \quad -5$

$-2x > -2$ $\quad -2x < -8$

$x < 1$ or $x > 4$



$(-\infty, 1) \cup (4, \infty)$

14. [10 points] Solve $x^3 - 4x^2 + 4x \leq 0$ using the test-point method. Write the solution set in interval notation.

$$x(x-2)^2 \leq 0$$

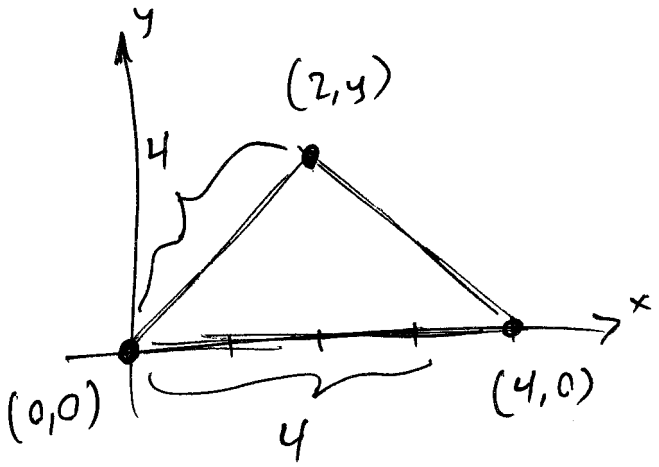
test $x=-1$: $-1(-1-2)^2 \stackrel{?}{\leq} 0$ ✓ shade

test $x=1$: $1(1-2)^2 \stackrel{?}{\leq} 0$ ✗ don't shade

test $x=3$: $3(3-2)^2 \stackrel{?}{\leq} 0$ ✗ don't shade

$$(-\infty, 0] \cup \{2\}$$

15. [10 points] Find a point $(2, y)$ so that the triangle with vertices $(0,0)$, $(4,0)$, and $(2,y)$ will be equilateral. (*Hint:* Draw a picture.)



$$\text{dist}((0,0),(2,y)) = 4$$

$$\sqrt{(2)^2 + (y)^2} = 4$$

$$\sqrt{4+y^2} = 4$$

$$4 + y^2 = 16$$

$$y^2 = 12$$

$$y = \pm 2\sqrt{3}$$

pick positive (could also pick negative)

$$(2, 2\sqrt{3})$$