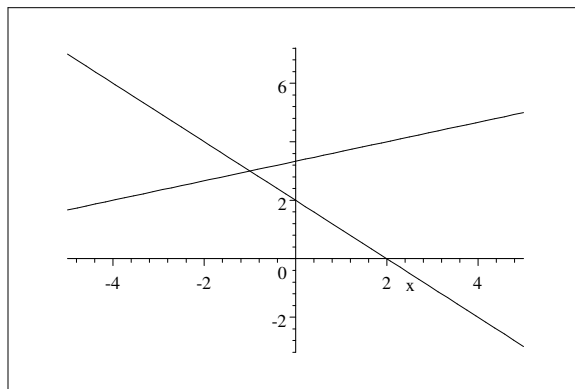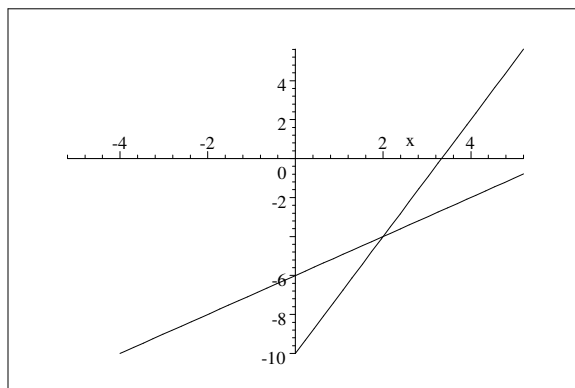Fundamental Math 10033 Chapter 4
Supplemental Problems

SECTION 4.1
Solving Systems by Graphing

Approximate the point of intersection and use your answer to determine whether this ordered pair is a solution to the system.

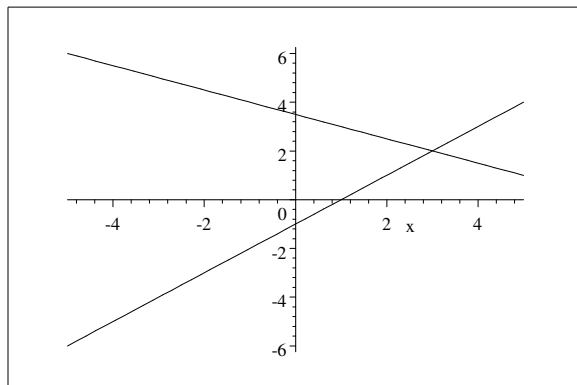1. $\left\{ \begin{array}{l} x - 3y + 10 = 0 \\ x + y = 2 \end{array} \right\}$

2. $\left\{ \begin{array}{l} x - y = 6 \\ 3x - y = 10 \end{array} \right\}$

3. $\left\{ \begin{array}{l} x - y = 1 \\ x + 2y = 7 \end{array} \right\}$

4.
$$\begin{cases} 3x - 4y + 12 = 0 \\ x + y + 3 = 0 \end{cases}$$
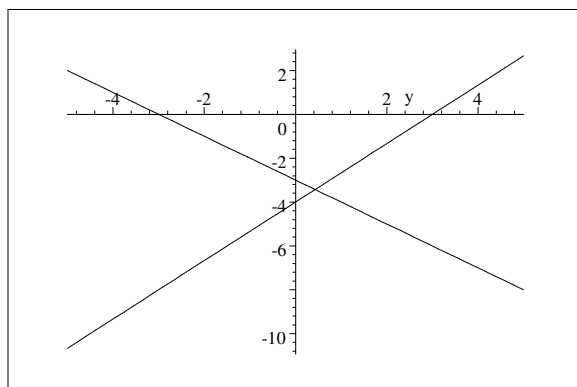
Solve the system by graphing. Plot at least two points for each line. Check your solution in both equations.

5.
$$\begin{cases} 2x + y - 5 = 0 \\ 3x + 9y = 15 \end{cases}$$

6.
$$\begin{cases} x + 5y + 9 = 0 \\ 4x + 13 = 13y \end{cases}$$

7.
$$\begin{cases} x + 4y = 1 \\ x - 4y - 1 = 0 \end{cases}$$

8.
$$\begin{cases} 6x + 5y = 45 \\ 3x + 2y - 18 = 0 \end{cases}$$

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9. $\left\{\begin{array}{l} 4x - y = 6 \\ 2x + 3y = 10 \end{array}\right\}$

10. $\left\{\begin{array}{l} x + 2y = 12 \\ 5y - 3x + 25 = 0 \end{array}\right\}$

11. $\left\{\begin{array}{l} x + y = 7 \\ 3y - 2x = 16 \end{array}\right\}$

12. $\left\{\begin{array}{l} 3x + 4y = 26 \\ 4x + 3y - 30 = 0 \end{array}\right\}$

SECTION 4.2
Solve the System without Graphing
Solve the system by substitution:

1. $\left\{\begin{array}{l} 3x - y = 1 \\ 5x + y = 7 \end{array}\right\}$

2. $\left\{\begin{array}{l} 4x - y + 16 = 0 \\ 2x + 5y = 14 \end{array}\right\}$

3. $\left\{\begin{array}{l} 2x - y = 20 \\ x - y + 15 = 0 \end{array}\right\}$

4. $\left\{\begin{array}{l} x + 7y = 3 \\ \frac{5}{2}x + 6y + 4 = 0 \end{array}\right\}$

5. $\left\{\begin{array}{l} x + 5y = -9 \\ 4x - 3y = -13 \end{array}\right\}$

6. $\left\{\begin{array}{l} x + \frac{1}{2}y + 5 = 0 \\ x - \frac{1}{2}y = 1 \end{array}\right\}$

7. $\left\{\begin{array}{l} 3x - y = 7 \\ 9x - 3y - 21 = 0 \end{array}\right\}$

8. $\left\{\begin{array}{l} \frac{1}{2}x + 5y = -4 \\ 7x - 3y = 17 \end{array}\right\}$

9. $\left\{\begin{array}{l} 2x + 5y + 20 = 0 \\ x + \frac{5}{2}y = -10 \end{array}\right\}$

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10. $\begin{cases} x - 5y = 15 \\ 0.1x - 0.5y - 5 = 0 \end{cases}$

11. $\begin{cases} 2x + y = 6 \\ 3x - 4y = 12 \end{cases}$

12. $\begin{cases} x + 2y = 5 \\ 10y - 3x + 7 = 0 \end{cases}$

Solve the system by addition-elimination.

13. $\begin{cases} x - y = 2 \\ 2x - y = -3 \end{cases}$

14. $\begin{cases} 4x + y = 24 \\ x + 2y = 2 \end{cases}$

15. $\begin{cases} 2x - 3y + 3 = 0 \\ x + 2y = 9 \end{cases}$

16. $\begin{cases} 6x + 3y = 0 \\ 2y = 6 - 4x \end{cases}$

17. $\begin{cases} \frac{1}{2}x - 5y = 6 \\ 3x - 2y = 8 \end{cases}$

18. $\begin{cases} x + 8y + 18 = 0 \\ \frac{1}{2}x + 3y = 6 \end{cases}$

19. $\begin{cases} 4x = 7y - 6 \\ 9y + 12x = 12 \end{cases}$

20. $\begin{cases} 4x + 6y - 6 = 0 \\ 3y - 3 = -2x \end{cases}$

21. $\begin{cases} 0.02x - 0.03y = 1 \\ 4y - x = 4 \end{cases}$

22. $\begin{cases} 3x + \frac{y}{3} = 13 \\ 4x - \frac{3y}{2} + 6 = 0 \end{cases}$

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23. $\begin{cases} 0.2x + 0.6y = 1 \\ 0.5x + 0.6y + 0.2 = 0 \end{cases}$

24. $\begin{cases} \frac{x}{2} + \frac{y}{6} = \frac{1}{2} \\ 0.1x - 0.3y = 0.3 \end{cases}$

SECTION 4.3
Applications of Systems

1. A shopper pays $20.75 for four pounds of a nut mixture consisting of almonds and pecans. If almonds cost $3.50 per pound and pecans cost $6.00 per pound. How much of each were purchased?

2. Kent Cinema took in $1,270 in ticket sales for a movie that 220 people attended. If a child's ticket sold for $4.50 and an adult ticket sold for $6.50. How many children attended the movie?

3. A recent mailing of 56 letters and postcards cost $21.72. If the letters cost $.42 each to mail and postcards cost $.27 each, how many of each were mailed?

4. This is a total of 22 coins in kitchen drawer consisting of only quarters and nickels. The total value of the coins is $3.90. How many nickels and how many quarters are there?

5. Three times the larger of the two numbers is 10 more than twice the smaller. Five times the smaller is 11 less than four times the larger. What are the numbers?

6. The tuition plus room and board comes to $20,800 per year. The room and board is $550 more than half the tuition. How much is the tuition, and what does room and board cost?

7. $6,000 is invested in two accounts. One account yields 8% annual interest while the other account yields $7\frac{1}{2}$% annual interest. If the annual return on the two investments is $464, how much was invested at each rate?

8. $9000 was invested one year ago. Part of the money was invested at 6% annual interest and the rest at 10%. If the total interest for the year was $652.80, how much was invested at each rate?

9. Walter invested some money at 5% annual interest and twice that amount at 6%. If his total annual interest was $127.50, how much was invested at each rate?

10. Janice invested some of $1,500 bonus into an account that paid $4\frac{1}{2}$% interest after one year. The rest of her bonus was invested in a mutual fund that suffered a 3% loss for the same year. If the net profit from both accounts was only $15, how much was invested in each account?

11. $10,000 is invested in two accounts paying 5% and 4% annual interest. The amount of interest at the end of one year is the same for both accounts. How much was invested in each account?

12. $2,000 is invested in two accounts paying 3% and 5% annual interest. After 1 year the amount of interest earned in the 5% account is double the amount earned in the 3% account. How much was invested in each account?

13. Yesterday Zach walked 6 miles. The first part of his walk was at 3 mph and the second part was at 4 mph. Today he walked a quarter mile further walking at 4 mph for the same length of time he walked the first part of his walk yesterday and at 3 mph of the same length of time he walked the second part yesterday. How long was his walk?

14. A jet takes 2 hours and 40 minutes to travel 1,120 miles with a tail wind. The return trip against the wind takes 2 hours and 48 minutes. What is the speed of the jet in still air?

15. A salmon travels downstream in 1 hour and 20 minutes. The return trip takes him 4 hours against the current. If the river flows a 1.5 mph, find the distance the salmon travels in one direction.

16. Meg traveled 7 miles yesterday walking for one half-hour and biking for one half-hour. Today traveling at the same rates she traveled 6 miles walking for 40 minutes and biking for 20 minutes. What was her walking and biking rates?

17. A plane flying cross-country 2,400 miles with the wind takes 3.75 hours. Against the wind it takes 4 hours. Determine the wind speed.

18. If Will can row a boat 1 mile upstream in 24 minutes and can row the same distance downstream in 12 minutes find Will's rowing speed and the speed of the current.

Fundamental Math 10033 Chapter 4
Supplemental Problems

SECTION 4.4
Nonlinear Systems

1. Solve the following system by graphing, substitution and elimination:
$$\left\{ \begin{array}{l} 3x - y = 5 \\ y - 7 = 0 \end{array} \right\}$$

2. Solve the following system by graphing and substitution:
$$\left\{ \begin{array}{l} y = x^2 - 4x \\ x + 2 = 0 \end{array} \right\}$$

3. Solve the following system by graphing and substitution:
$$\left\{ \begin{array}{l} y = |x - 3| \\ y - 2 = 0 \end{array} \right\}$$

4. Solve the following system by graphing, substitution, and elimination:
$$\left\{ \begin{array}{l} \frac{1}{2}x^3 - y = 0 \\ 4 + y = 0 \end{array} \right\}$$

5. Solve the following system by graphing:
$$\left\{ \begin{array}{l} 4x - y = 2x^2 \\ 2x + y = 0 \end{array} \right\}$$

6. Solve the following system by graphing:
$$\left\{ \begin{array}{l} y - 3 = |x + 1| \\ x + 2y = 8 \end{array} \right\}$$

7. Solve the following system by graphing:
$$\left\{ \begin{array}{l} y = 4 - x^3 \\ x - y + 2 = 0 \end{array} \right\}$$

8. Solve the following by graphing:
$$\left\{ \begin{array}{l} x^2 - 3x - y = 0 \\ y = |x| \end{array} \right\}$$

9. Solve the following system by graphing, substitution, and elimination:
$$\left\{ \begin{array}{l} y = x^2 - 8 \\ x^2 + y = 0 \end{array} \right\}$$

10. Solve the following system by graphing:
$$\left\{ \begin{array}{l} y = |x| - 1 \\ y + |x| = 3 \end{array} \right\}$$

11. Solve the following system by graphing:
$$\left\{ \begin{array}{l} y = x^2 \\ y = x^3 \end{array} \right\}$$

12. Solve the following system by graphing:
$$\left\{ \begin{array}{l} x^3 + y = 1 \\ y = |2x| - 2 \end{array} \right\}$$

SECTION 4.1
ANSWERS — Solving Systems by Graphing

1. $(-1,3)$
2. $(2,-4)$
3. $(3,2)$
4. $(0,-3)$

5. $(2,1)$
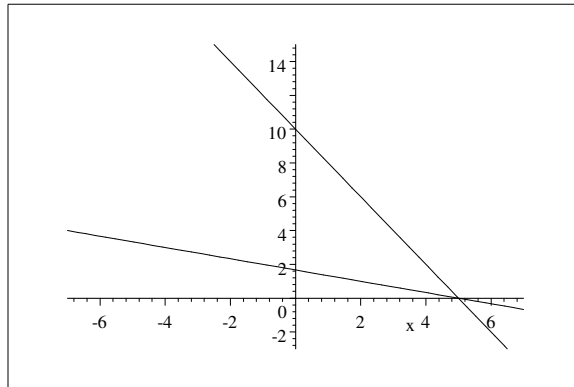
6. $(-4,-1)$
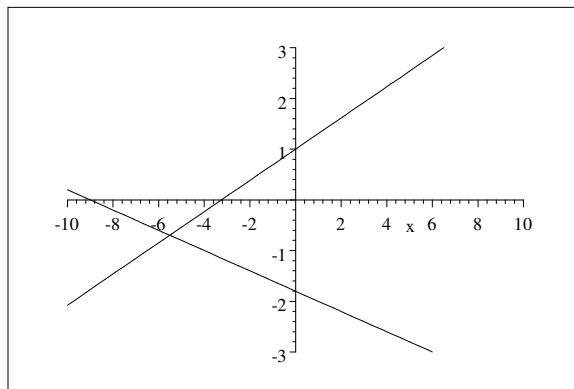
7. $(1,0)$
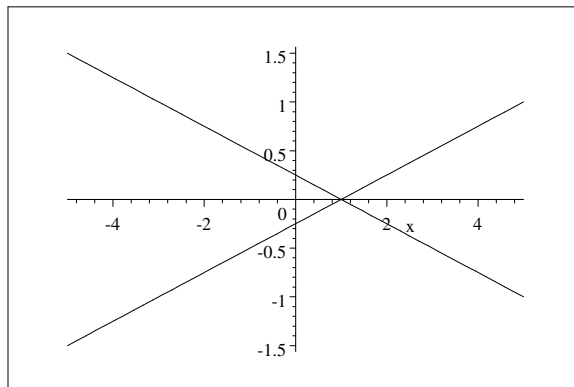
8. $(0,9)$

9. $(2,2)$
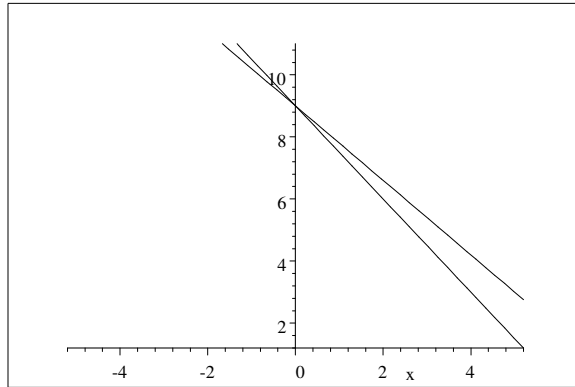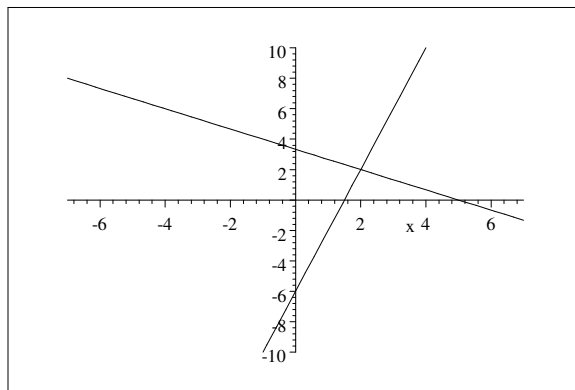
10. $(10,1)$
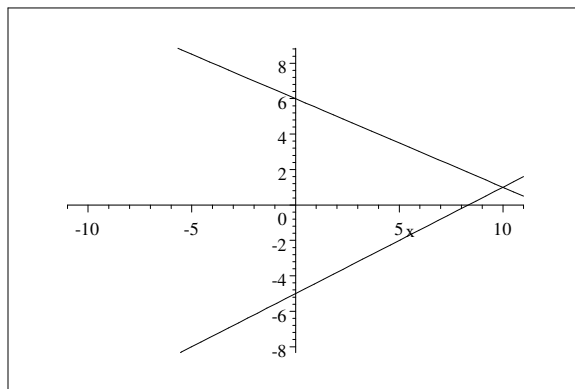
11. $(1,6)$
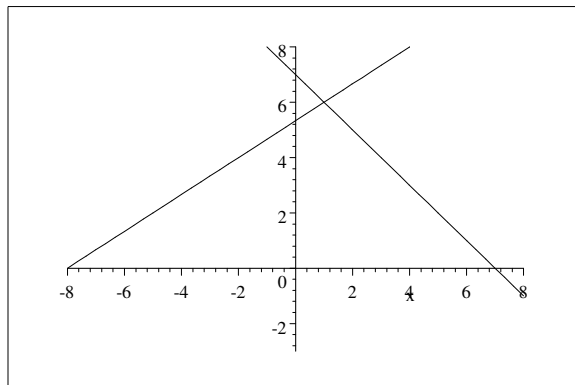
12. $(6, 2)$
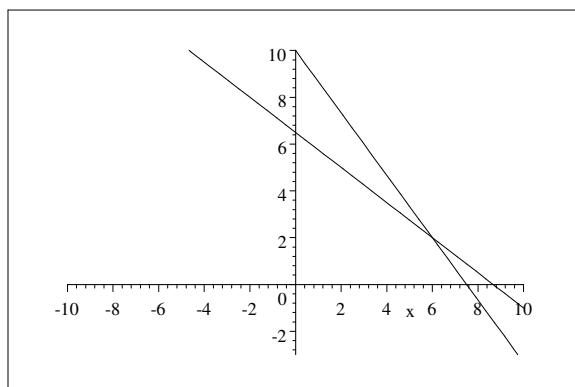
SECTION 4.2
ANSWERS — Solve the System without Graphing
1. $(1, 2)$
2. $(-3, 4)$
3. $(35, 50)$
4. $(-4, 1)$
5. $(-4, -1)$
6. $(-2, -6)$
7. Any point on the line (same line)
8. $(2, -1)$
9. Any point on the line (same line)
10. No solution
11. $\left(\frac{36}{11}, -\frac{6}{11}\right)$
12. $\left(4, \frac{1}{2}\right)$
13. $(-5, -7)$
14. $\left(\frac{46}{7}, -\frac{16}{7}\right)$
15. $(3, 3)$
16. No solution
17. $(2, -1)$
18. $(102, -15)$

19. $(\frac{1}{4}, 1)$
20. Every point on the line (same line)
21. $(82.4, 21.6)$
22. $(3, 12)$
23. $(-4, 3)$
24. $(1.2, -0.6)$

SECTION 4.3
ANSWERS — Applications of Systems

1. Almonds 1.3 lbs.
   Pecans 2.7 lbs.
2. 80
3. Letters 44
   Postcards 12
4. 8 Nickels
   14 Quarters
5. 4 and 1
6. Tuition $13,500
   Room & Board $7,300
7. $2,800 at 8%
   $3,200 at $7\frac{1}{2}$%
8. $6,180 at 6%
   $2,820 at 10%
9. $750 at 5%
   $1,500 at 6%
10. $800 at $4\frac{1}{2}$%
    $700 at 3% loss
11. $4,444.44 at 5%
    $5,555.56 at 4%
12. $909.09 at 3%
    $1,090.91 at 5%
13. $1\frac{3}{4}$ hours
14. 410 mph
15. 6 miles
16. walking 4 mph
    biking 10 mph
17. plane 620 mph
    wind 20 mph
18. rowing 3.75 mph
    current 1.25 mph

SECTION 4.4
ANSWERS — Nonlinear Systems

1. $(4, 7)$
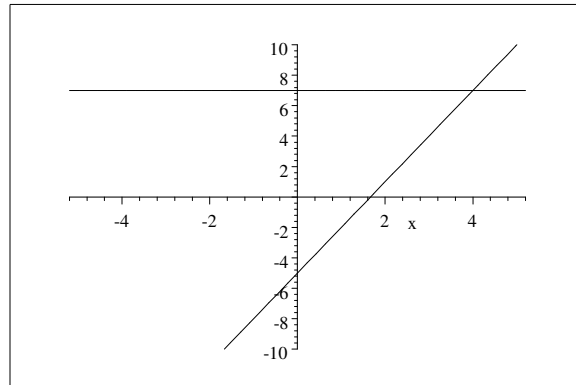
2. $(-2, 12)$

3. $(1, 2)$ and $(5, 2)$
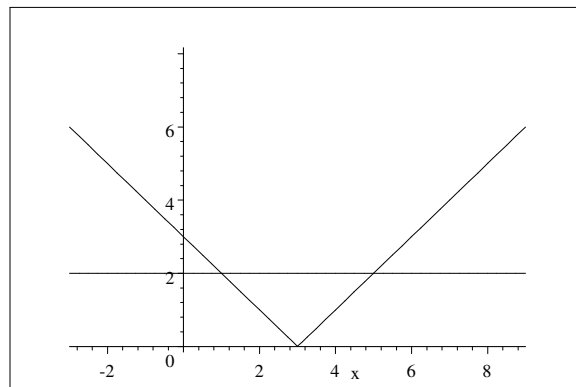
4. $(-2, 4)$
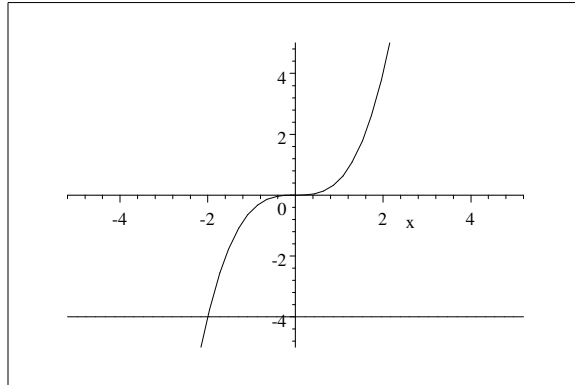
5. $(0,0)$ and $(3,-6)$

6. $(0,4)$ and $(-4,6)$

7. $(1,3)$
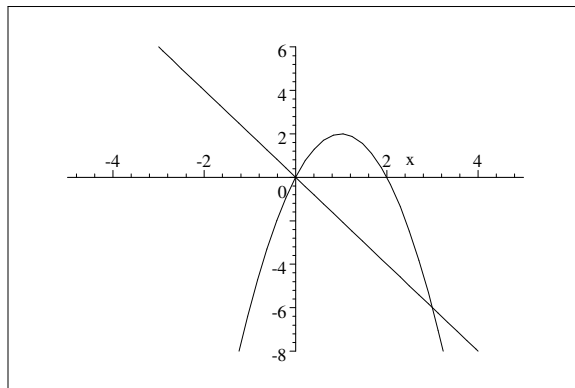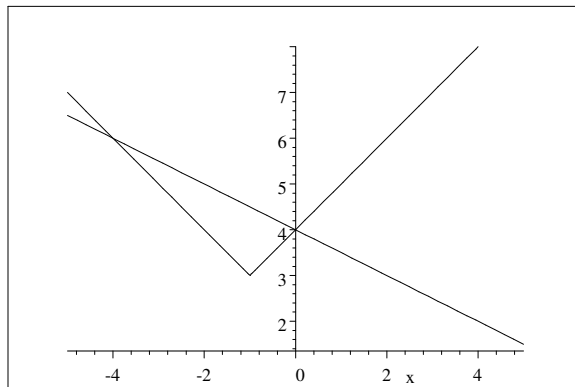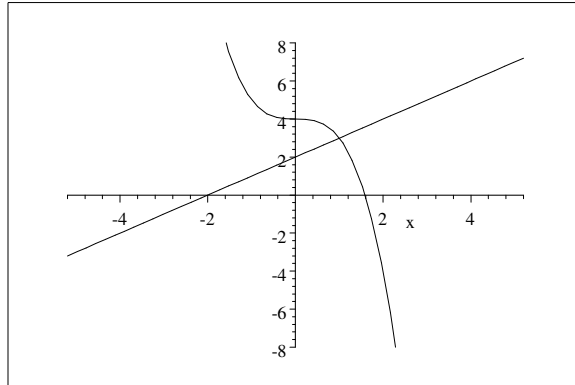
8. $(0,0)$ and $(4,4)$

9. $(-2,-4)$ and $(2,-4)$

10. $(-2,1)$ and $(2,1)$

11. $(1,1)$ and $(0,0)$

12. $(1,0)$