

Solutions to sample problems 1

1. $x = -3$ and $x = 9$
2. $y - 7 = -1.4x$
3. $y - 2 = -2(x - 7)$
4. $y - 2 = .5(x - 7)$
5. $y = 2$
6. $y - 15 = \frac{5}{11}(x - 0)$
7. (a) $C(x) = 8x + 48,000$
 (b) \$40
 (c) $R(x) = 40x$
 (d) $P(x) = 32x - 48,000$
8. equilibrium price \$6
 equilibrium quantity 7
9. $k = .5$
10. (a) $y = -49.6667x + 911.6667$
 (b) see class notes.
 (c) 563.9998
 (d) 1979
 (e) 414.9997
11. See section 2.3 example 1 or 4.
12. See section 2.2 example 5 or 6.
13. See section 2.3 example 2 or 3.
14. (a) **I** x = the amount invested in high-risk stocks.
 y = the amount invested in medium-risk stocks.
 z = the amount invested in low-risk stocks.
II $x + y + z = 300,000$
 $.16x + .10y + .04z = 33,000$
 $2x - y + 2z = 0$
III $x = \$75,000$, $y = \$200,000$, and $z = \$25,000$
- (b) **I** x = number of tank cars purchased with 6,000 gallon capacity
 y = number of tank cars purchased with 8,000 gallon capacity
 z = number of tank cars purchased with 18,000 gallon capacity
II $x + y + z = 24$
 $6000x + 8000y + 18000z = 250000$

III) Parametric solution:

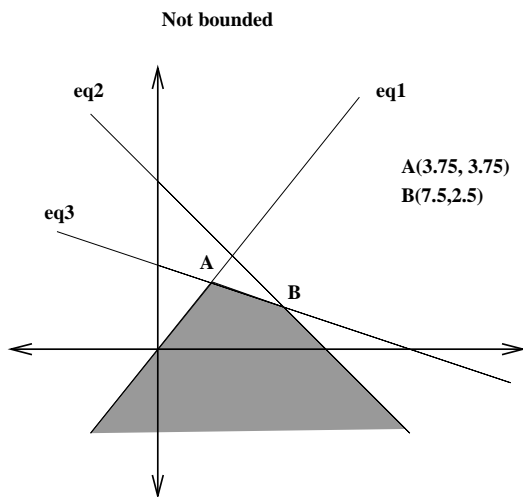
$$x = -29 + 5z$$

$$y = 53 - 6z$$

$$z = \text{any number}$$

We can not buy a part of a tank car. So z must be an integer. The first equation of the parametric solution tell us that $z \geq 5.8$ This is found by setting x equal to zero and solving for z . The second equation says that $z \geq 8.8333$. Taken all together, we find that $z = 6, 7, 8$.

15. $x = 1$, $y = -7.5$, and $z = 6.5$
16. $x = 20$, $y = -11$, $u = 5$, and $z = -2$
17. $J = \begin{bmatrix} 7 & -8 & 5 \\ -24.5 & 27 & -8.5 \\ 105 & -100 & 19 \end{bmatrix}$
18. See section 2.5 example 3.
19. $D + C =$ not possible: not same dim.
 $D - 3B = \begin{bmatrix} -2 & 1 & -9 \\ -1 & -3 & -1 \end{bmatrix}$
 $DC = \begin{bmatrix} 1 & -6 \\ 7 & 6 \end{bmatrix}$
 $DA =$ not possible: the number of rows in A is not equal to the number of cols. in D .
 $B + C^T = \begin{bmatrix} 2 & -1 & 7 \\ -2 & 4 & 0 \end{bmatrix}$
 B^{-1} not possible B is not square.
 $A^{-1} = \begin{bmatrix} 1 & 0 \\ -0.5 & -0.5 \end{bmatrix}$
 E^{-1} not possible, singular matrix.
20. See solution in the back of the book.
21. (a) $x = -14$, $y = 39$, $z = -9$
 (b) $x = 12$, $y = 37$, $z = -10$
 $eq1: -x + y \leq 0$
22. $eq2: x + y \leq 10$
 $eq3: 5x + 15y \leq 75$



23. x = number of model A radios produced.
 y = number of model B radios produced.

Objective function: $P = 12x + 10y$

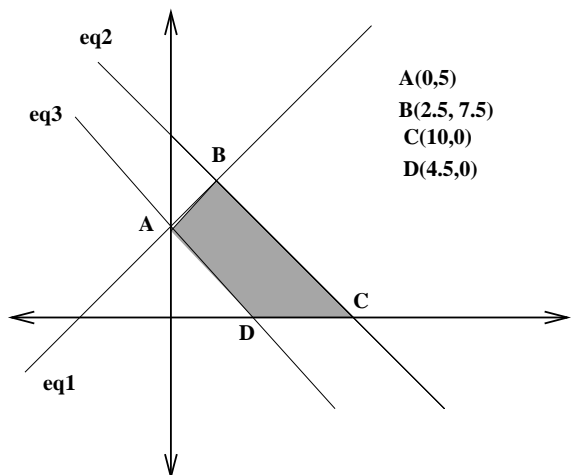
constraints:

$$15x + 10y \leq 1500$$

$$10x + 12y \leq 1320$$

$$x \geq 0 \text{ and } y \geq 0$$

24. feasible region



25. max at (2.5, 7.5) maximum value is 25.

26. min at (4.5, 0) minimum value is 4.5.