

## Solutions to HW 4

1.3, 48  $T(20) = 2.25 * 20 + 17.69 = 57.69$ . The per capita tax burden in 2000 was 5769 dollars.

1.3, 50 (a) The slope is -0.03, and the  $p$ -intercept is 32.88.

(b) The percentage of high school students smoking decreases by 0.03 per year.

(c) In 1975, the 32.88 percent of high school students were smoking.

1.3, 56  $y = 5.19 + 51.91x$ .

1.3, 60 (a) Yes, it is 0.02.

(b) Use the point-slope form:

$$y - 0.11 = 0.02(x - 5) \Leftrightarrow y = 0.02x + 0.21.$$

1.3, 64  $y = -4000x + 960,000$ .

1.5, 44 Let  $A$  be the amount in cc of the 40% solution, and  $B$  the amount in cc of the 10% solution. Since the final solution should be 25cc, we see that  $A + B = 25$ . Moreover, since the final solution should be 25cc of a 28% solution, it should contain 7cc of plant nutrient. On the other hand,  $A$  cc of a 40% solution contain  $0.4A$  cc of plant nutrient and similarly  $B$  cc of a 10% solution contain  $0.1B$  cc of plant nutrient. Hence we need that  $0.4A + 0.1B = 7$ . The solution to this system of equations is  $A = 15, B = 10$ .

1.5, 46 The total intake of medication is 56 mg, hence  $A + B = 56$ . The ratio of the dosage of A to the dosage of B is 5 to 8, hence  $\frac{A}{B} = \frac{5}{8}$ , i.e.  $8A = 5B$ . The total amount of medication A per day is 19.46, and the total amount of medication B per day is 31.13. Hence the dosage for A is 3.24mg, and the dosage for B is 15.565mg.

1.5, 48 Let  $P$  denote the pounds of peanuts, and  $C$  the pounds of Cashews. The wholesaler wants to make a mix of 100 pounds, i.e.,  $P + C = 100$ . The total price of a mix of  $P$  pounds of peanuts and  $C$  pounds of Cashews is  $2.8P + 5.3C$ . The wholesaler wants the total mix to cost 330 dollars, so we get a second equation  $2.8P + 5.3C = 330$ . So he needs to use 20 pounds of Cashews and 80 pounds of peanuts.

1.5, 52 Let  $s$  be the glasses of skim milk,  $m$  the number of quarter-servings of beef, and  $b$  the number of 2-slice servings of bread. For each nutrient we get an equation. If one consumes  $s$  glasses of milk,  $m$  quarter servings of beef and  $b$  2-slice servings of bread, one will get  $0.1s + 3.4m + 2.2b$  mg of iron,  $8.5s + 22m + 10b$  g of protein, and  $1s + 20m + 12b$  g of carbohydrates. Hence we need to solve the system of linear equations

$$0.1s + 3.4m + 2.2b = 10.5$$

$$8.5s + 22m + 10b = 94.5$$

$$s + 20m + 12b = 61.$$

Solving this system of equations, we see that the person should drink 5 glasses of skim milk, eat 1 serving of meat, and 3 servings of bread.

1.6, 04 (a)  $P(x) = R(x) - C(x) = 300x - 3300$ .

(b)  $P(351) = 102300$ .

(c) The break even point is when  $P(x) = 0$ , i.e.,  $x = 11$ . So at least 11 items have to be sold to avoid losing money.