

MAT.1180 - MATHEMATICAL CONCEPTS AND APPLICATIONS

CHAPTER 6 (Sep, 11)

- Linear Equation

- A **linear equation** in one variable x is an equation that can be written in the form

$$ax + b = 0$$

where a and b are real numbers, and $a \neq 0$.

- **Addition Property** of equality

$$a = b \Leftrightarrow a + c = b + c$$

- **Multiplication Property** of equality

$$a = b \Leftrightarrow ac = bc, \text{ if } c \neq 0$$

- [ex] Solve for x , and check.

1. $4x + 5 = 29$
2. $6(x - 3) - 10x = -10$
3. $2x + 9 = 8x - 3$
4. $4(2x + 1) = 29 + 3(2x - 5)$
5. $\frac{2x}{3} = 7 - \frac{x}{2}$

- The **Cross Product Principle** for Proportions.

$$\frac{a}{b} = \frac{c}{d} \Rightarrow ad = bc$$

- [ex] Solve for x .

1. $\frac{10}{x} = \frac{2}{3}$
2. $\frac{22}{60 - x} = \frac{2}{x}$

- [ex] Solve for x .

1. $3x + 7 = 3(x + 1)$
2. $7x + 9 = 9(x + 1) - 2x$

- Applications of Linear Equation

- [ex] Write an algebraic expression.

1. 5 more than x
2. x is increased by 6
3. The difference between x and 4
4. 6 less x
5. 3 less than x
6. Twice x
7. The quotient of x and 4
8. The reciprocal of x
9. The sum of twice x and 7
10. Twice the sum of x and 7
11. 25% of the difference of 4 times x and 5

12. The quotient of x increased by 2 and x decreased by 2

– [ex] Applications.

1. You are choosing between two long-distance telephone plans. Plan A has a monthly fee of \$15 with a charge of \$0.08 per minutes for all long-distance calls. Plan B has a monthly fee of \$13 with a charge of \$0.12 per minute for all long-distance calls. For how many minutes of long-distance calls will the costs for the two plans be the same?
2. Alex, Brad and Catherine together have \$100. Brad has \$20 than Alex. Catherine has twice as much as Brad has. Find out how much money each of them have.

– [ex] Given that $T = D + pm$. Express m in terms of other variables.

– [ex] Given that $P = 2l + 2w$. Solve for l .

• Linear inequality

– [ex] Graph the following sets on a number line.

1. $\{x|x < 1\}$
2. $\{x|x \leq 2\}$
3. $\{x|x > 3\}$
4. $\{x|x \leq 2\}$
5. $\{x|1 < x < 3\}$
6. $\{x|2 \leq x \leq 4\}$
7. $\{x|3 \leq x < 5\}$
8. $\{x|1 < x \leq 5\}$

– A linear inequality in x is of the form

$$ax + b < 0; ax + b \leq 0; ax + b > 0; ax + b \geq 0$$

where $a \neq 0$.

– [ex] Solve the following inequalities, and graph the solution on a number line.

1. $4x - 7 \leq 5$
2. $\frac{1}{4}x \leq 2$
3. $-6x < 18$
4. $7x - 3 > 13x + 33$
5. $2(x - 3) - 1 \leq 3(x + 2) - 14$
6. $1 \leq 2x + 3 < 11$