

Name: \_\_\_\_\_

MATH 101

Summer 2022

HW 6: Due 06/02

*“The fact that we live at the bottom of a deep gravity well, on the surface of a gas covered planet going around a nuclear fireball 90 million miles away and think this to be normal is obviously some indication of how skewed our perspective tends to be.”*

*–Douglas Adams*

**Problem 1.** (10pt) Determine whether the following lines are parallel, perpendicular, or neither. Be sure to justify your answer.

$$\ell_1: y = \frac{2}{3}x + 5$$

$$\ell_2: 3x - 2y = 8$$

**Problem 2.** (10pt) Determine whether the following lines are parallel, perpendicular, or neither. Be sure to justify your answer.

$$\ell_1: -5x + 6y = 6$$

$$\ell_2: 5x + 6y = -12$$

**Problem 3.** (10pt) Find the equation of the line with  $x$ -intercept  $(6, 0)$  and passing through the point  $(-1, 10)$ .

**Problem 4.** (10pt) Find the equation of the line perpendicular to the line  $2x - 3y = 5$  that passes through the origin.

**Problem 5.** (10pt) Find the equation of the line that contains  $(1, -1)$  and is parallel to the line  $3x + y = 11$ .

**Problem 6.** (10pt) Showing all your work, solve the following equation and verify that your solution is correct:

$$5x - 7 = 7 - 2x$$

**Problem 7.** (10pt) Showing all your work, solve the following equation and verify that your solution is correct:

$$2(1 - x) = 6x + 11$$

**Problem 8.** (10pt) Showing all your work, solve the following equation and verify that your solution is correct:

$$\frac{x-1}{x+3} = 5$$



**Problem 9.** (10pt) Suppose you sell automobiles. You earn a weekly baseline salary of \$820 per week and make 3% commission on your sales. Let  $I(s)$  denote your weekly income if you make  $s$  dollars in sales.

- (a) Explain why  $I(s)$  is linear.
- (b) Find  $I(s)$ .
- (c) Find and interpret the slope and  $y$ -intercept of  $I(s)$  in context, if possible.
- (d) How much in sales do you have to make in a given week to have made \$1,500?

**Problem 10.** (10pt) The amount of people, on average, that have entered a store  $t$  hours after it has opened,  $P(t)$ , can be modeled by  $P(t) = 30.5t - 4$ .

- (a) What does  $P(t)$  being linear imply about the rate that people enter the store?
- (b) Find and interpret the slope and  $y$ -intercept of  $I(s)$  in context, if possible.
- (c) Find  $P(2)$  and interpret the value.
- (d) How long after opening until 400 people have entered the store?