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.

$$\ell_1 \colon -5x + 6y = 6$$
$$\ell_2 \colon 5x + 6y = -12$$

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 an 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 an 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?