**Assessment Instructions:**

- The Assessment 2 is 10 problems and is worth 40 points. Each numbered problem will earn you a score of 1-4 based on your set up of the function, your use of course methods to solve and prove your solution and your statement of the solution.
- You will have 1 hour to complete AS-2.
- The AS-2 is closed book and closed notes.
- Calculators are not allowed on the Assessment.

1. Find the equation of the line that:
   (a) passes through $(5, 0)$ and is perpendicular to $-5x + 2y = 1$
   (b) passes through $(2, -1)$ and is parallel to $y = -3x + 4$
   (c) is parallel to $y$-axis and has an $x$-intercept at $(2, 0)$
   (d) is perpendicular to the $x$-axis and passes through $(-2, -3)$
   (e) passes through the point $(3, -4)$ and $(2, 9)$
   (f) satisfies $f(1) = -5$ and $f(9) = 4$

2. Given the two points, find the length of the line segment between the points and the midpoint of the segment:
   (a) $(3, 2)$ and $(5, 1)$
   (b) $(2, 2)$ and $(8, 3)$
   (c) $(5, 4)$ and $(4, 3)$

3. Graph the linear inequality:
   (a) $x + y > 0$
   (b) $-(y - x) > -\frac{5}{2} - y$
   (c) $-2y \leq -x + 4$
   (d) $y > -2$ and $2y > -3x - 4$
   (e) $-2y < -3x - 6$ or $-3y \geq -6x - 18$

4. Graph the absolute value linear inequality:

   (a) $|3y - 1| \leq 2$

   (b) $|x + y| \geq 1$

   (c) $|x - 3| > 2$

5. Find the standard form for the equation of the circle:

   (a) $9x^2 + 9y^2 - 18x + 36y + 44 = 0$

   (b) center $(12, -4)$ passing through $(-9, 5)$

   (c) endpoints of the diameter are $(-8, 6)$ and $(1, 11)$

   (d) $5x^2 + 5y^2 + 50x + 40y = -185$

   (d) $x^2 + y^2 - 18x - 8y + 48 = 0$

6. Sketch the graph:

   (a) $(x + 2)^2 + y^2 = 169$

   (b) $(x + 3)^2 + (y - 7)^2 = 64$

   (c) $x^2 + y^2 + 8x = 9$

7. For each of the following relations, determine the domain and range:

   (a) $R = \{(0, 0), (-5, 2), (3, 3), (5, 3)\}$

   (b) $3x - 4y = 17$

   (c) $y = x^2$

   (d) $x = 4x$

8. Rewrite each of the following relations as a function of $x$ and evaluate it at $x = -1$:

   (a) $6x^2 - x + 3y = x + 2y$

   (b) $\dfrac{9y + 2}{6} = \dfrac{3x - 1}{2}$

9. Identify the domain, the codomain, and the range of the following functions:

   (a) $f : \mathbb{N} \to \mathbb{N}$ and $f(x) = x + 5$

   (b) $h : [0, \infty) \to \mathbb{R}$ and $h(x) = \sqrt{x}$

10. Determine the implied domain of the following functions:

    (a) $g(x) = \dfrac{2x}{1 - 3x}$

    (b) $h(x) = \sqrt{3 - x}$

    (c) $f(x) = \dfrac{5}{\sqrt{3 - x^2}}$

11. Graph the following linear functions:

    (a) $y = -2$

    (b) $f(x) = 3 - 2x$

    (c) $g(x) = \dfrac{2x - 8}{4}$

12. For the given points use linear regression to find and graph the line of best fit along with the points and find the Pearson correlation coefficient $r$

    (a) $\{(1, 5), (2, -1), (3, 5), (4, 0), (5, 4)\}$

13. Graph the following quadratic functions (parabolas) and state the coordinates of its vertex:

    (a) $y = (x - 2)^2 + 3$

    (b) $f(x) = -3x^2 - 1$

    (c) $g(x) = 4x^2 - 6$

    (d) $f(x) = x^2 + 2x + 4$

14. Among all the pairs of numbers with a sum of 10, find the pair whose product is maximum.

15. The total revenue for Thompson's Studio Apartments is given by the function

$$R(x) = 100x - 0.1x^2,$$

    where $x$ is the number of rooms rented.

    What number of rooms rented produces the maximum revenue?