MATH 140A: MIDTERM II

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1. Find the center and radius of the circle $x^2 + 6x + y^2 - 2y + 6 = 0$.

2. Find the x-intercept of the line l, where the line l is parallel to the line $2x + y = 3$ and passes through $(1, 2)$.

3. Find an equation of the perpendicular bisector of the line segment joining the points $A(-3, 0)$ and $B(1, 2)$.

4. Evaluate $f(-1) \cdot f(1) \cdot f(2)$, where the function $f(x)$ is given by

$$f(x) = \begin{cases} x^2 + 2x & \text{if} \quad x \leq -1 \\ x & \text{if} \quad -1 < x \leq 1 \\ -1 & \text{if} \quad x > 1 \end{cases}$$

5. Find the domain of $(f \circ g)(x)$, where $f(x) = \sqrt{x}$ and $g(x) = 25 - x^2$. Express the solution using the interval notation.

6. (1) Write the equation for the final transformed graph: $f(x) = x^2$; shift to right 1 unit, stretch vertically by a factor of 2, and shift downward 3 units. (2) Sketch the graph of the final transformed function in problem (1).

7. Find the inverse function of $f(x) = 2x + 5$.