Submit your solutions to the following problems in lecture on the due date above. Present your work in a clean and organized fashion, either on a printed copy of this document (preferred) or a separate sheet of paper. As stated in the syllabus, late submissions will not be accepted.

1. Find all points where the circle centered at (5, 3) with radius 5 intersects the line that has slope $\frac{1}{2}$ and passes through the point (0, -2).

   **Circle**: $(x-5)^2 + (y-3)^2 = 25$
   
   **Line**: $y = \frac{1}{2}x - 2$

2. Suppose $f(x) = (x - 6)^2 + 2$ with domain $[6, \infty)$.

   (a) Find the inverse function $f^{-1}(x)$, and state its domain.

   \[ y = (x - 6)^2 + 2 \]
   \[ \sqrt{x - 6} = y - 6 \]
   \[ x - 6 = (y - 6)^2 \]
   \[ x = (y - 6)^2 + 6 \]

   \[ f^{-1}(x) = \sqrt{x - 6} + 6 \]

   (b) Verify that $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$.

   \[ f(f^{-1}(x)) = \left(\sqrt{x - 6} + 6 - 6\right)^2 + 2 = (\sqrt{x - 6})^2 + 2 \]
   \[ f^{-1}(f(x)) = \sqrt{(x - 6)^2 + 2} + 6 = \sqrt{(x - 6)^2 + 2} + 6 \]

   (c) Graph $f(x)$ and $f^{-1}(x)$ on the same axes (without using a calculator). What about the shape of their graphs tells you that they are inverse functions?

They are reflections about the line $y = x$. 