

Math 16A: Short Calculus I
 Fall 2017, Section 3
 Homework Sheet 1
 Due: Monday, October 2, 2017

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: $(x-5)^2 + (y-3)^2 = 25$ $(x-5)^2 + (\frac{1}{2}x-2-3)^2 = 25$
 line: $y = \frac{1}{2}x - 2$ $x^2 - 10x + 25 + \frac{1}{4}x^2 - 5x + 25 = 25$
 $\frac{5}{4}x^2 - 15x + 25 = 0$ $x^2 - 12x + 20 = 0$ $(x-10)(x-2) = 0$
 $x = 10$ or $x = 2$
 $y = \frac{1}{2}(10) - 2 = 3$ $y = \frac{1}{2}(2) - 2 = -1$
 $(10, 3)$ and $(2, -1)$

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

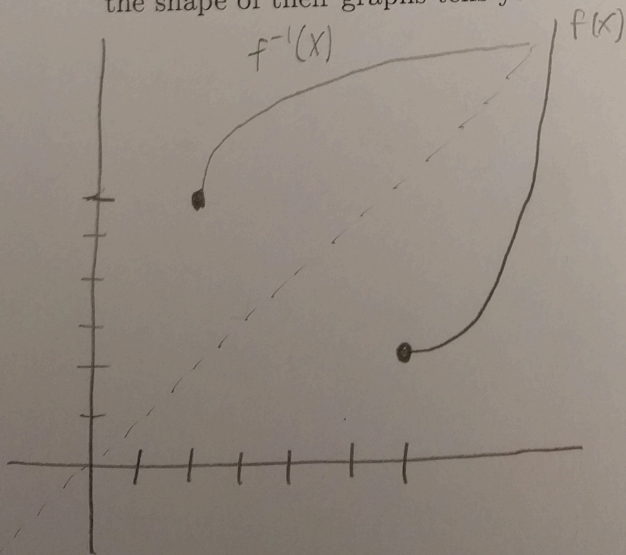
- (a) Find the inverse function $f^{-1}(x)$, and state its domain.

$y = (x-6)^2 + 2$
 switch x 's and y 's:
 $x = (y-6)^2 + 2$
 $x-2 = (y-6)^2$
 $\sqrt{x-2} = y-6$
 $\sqrt{x-2} + 6 = y$
 $f^{-1}(x) = \sqrt{x-2} + 6$

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

$f(f^{-1}(x)) = ((\sqrt{x-2} + 6) - 6)^2 + 2 = (\sqrt{x-2})^2 + 2 = x - 2 + 2 = x$
 $f^{-1}(f(x)) = \sqrt{((x-6)^2 + 2) - 2} + 6 = \sqrt{(x-6)^2} + 6 = |x-6| + 6 = x - 6 + 6 = x$

- (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 $y=x$.