Chapter 1.3: Inverse Functions

Calculus I

College of the Atlantic. September 23, 2024

1. Consider $f(x)$ given below:

x	$f(x)$
-2	-6
-1	-4
0	-2
1	0
2	2
3	4

   (a) What is $f^{-1}(0)$?
   (b) What is $f^{-1}(-4)$?
   (c) Graph $f(x)$.
   (d) Graph $f^{-1}(x)$.
   (e) How are the graphs of $f(x)$ and $f^{-1}(x)$ related? Why?

2. Let $f(x) = (x+3)^5$

   (a) Write $f(x)$ as a compound function: $f(x) = g(h(x))$.

   (b) Determine $g^{-1}(x)$ and $h^{-1}(x)$ and use this information to find $f^{-1}(x)$.

3. Which of the following functions are invertible?

   (a) $f(x) = 3x + 2$
   (b) $g(x) = x^2$
   (c) The cost c of x pounds of lentils purchased in bulk.
   (d) $h(t)$, the number of hamburgers eaten by Jamie McKown on day t, where t is measured in days since January 1, 2010.
   (e) $H(t)$, the total, cumulative number of hamburgers eaten by Jamie McKown since January 1, 2010 (where t is measured in days since January 1, 2010).

4. Let $S(Q)$ give the fraction of TAB patrons consuming salads as a function of the quality of lunch entree. Assume that the lunch quality Q is measured on a scale of 1 to 5, with 5 indicating yumminess and 1 indicating in-edibility.

   (a) Sketch a possible graph for $S(Q)$.
   (b) What is the range of S?
   (c) What is the domain of S?
   (d) What is the meaning of $S(4.2) = 0.5$?
   (e) What is the meaning of $S^{-1}(0.78) = 3.9$?