

Suggested problems week #5

6-95. See answers in bold in the table below. $y = 3^x$

x	y
0	1
1	3
2	9
3	27
4	81
5	243
6	729
7	2187
8	6561

6-96. In $2 = 1.04^x$ the variable is the exponent, but in $56 = x^8$ the exponent is known so you can take the 8th root.

6-97. $x > 100$, because $10^2 = 100$.

6-98. Answers vary but students should recognize that $0 < b < 1$.

6-99. See below:

a. $\frac{1}{8}$

b. $\frac{1}{x}$

c. $m \approx 1.586$

d. $n \approx 2.587$

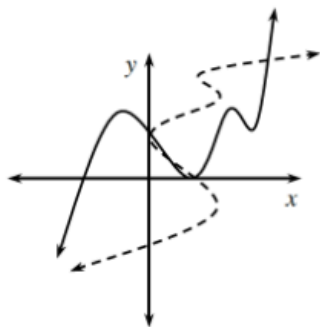
e. Answers vary. $x = b^{1/a}$

6-100. $2^{1/2} = \sqrt{2}$ and $2^{-1} = \frac{1}{2}$

6-102. See below:

a. Yes.

b. See graph below, (it is not a function).



c. Not necessarily.

d. Functions that have inverse functions have no repeated outputs; a horizontal line can intersect the graph in no more than one place.

e. Yes; for example, a sleeping parabola is not a function, but its inverse is a function.

6-103. See below:

- a. $x = -3, y = 5, z = 10$
- b. There are infinitely many solutions.
- c. The planes intersect in a line.

6-113. See below:

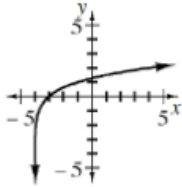
- a. $x \approx 5.717$
- b. $x \approx 11.228$

6-114. See below:

- a. $\frac{x^2}{x-1}$
- b. $\frac{b+a}{a-a^2b}$

6-115. $\frac{\log_5 7}{\log_5 2}$

6-116. It is the $\log_3(x)$ graph shifted 4 units to the left. See graph below.



6-117. 16.5 months; 99.2 months

6-121. See below:

- a. $\frac{6x-21}{x^2-3x-4}$
- b. $\frac{5}{x^2-9}$

6-122. See below:

- a. 20, 100, 500
- b. $n = 7$
- c. No, because there are no terms between the 6th term (62,500) and the 7th term (312,500).

6-127. See below:

- a. $y = 40(1.5)^x$
- b. When $x = -9$, or 9 days before the last day of October (October 22).

6-128. Possible answer: $4^{(x+1)} = 6$

6-129. Sample solutions below:

- a. $\frac{2}{3} \log(8), \frac{1}{3} \log(8^2), 2\log(\sqrt[3]{8})$
- b. $\log 5^{-2}, -\log 25, 2\log \frac{1}{5}$
- c. $\log n^b a^b, b \log(na)^o, b \log na$

6-130. The graph should show a decreasing exponential function which will have an asymptote at room temperature. Students should realize that the temperature of the drink would not drop below the ambient temperature of the room.

6-131. $y = x^2 - 6x + 8$

6-132. See below:

a. $x \geq \frac{1}{2}$ and $y \geq 3$

b. $g(x) = \frac{(x-3)^2+1}{2}$

c. $x \geq 3$ and $y \geq \frac{1}{2}$

d. x

e. x (They are the same, because f and g are inverses.)

6-133. See below:

a. $x \approx 6.24$

b. $x = 5$

6-135. See below:

a. $x + 5$

b. $a + 5$

c. $x - y$

d. $\frac{x^2+1}{x^2-1}$

6-136. See below:

a. $p^{-1}(x) = \sqrt[3]{\left(\frac{x}{3} - 6\right)}$

b. $k^{-1}(x) = \sqrt[3]{\left(\frac{x-6}{3}\right)}$

c. $h^{-1}(x) = \frac{x+1}{x-1}$

d. $j^{-1}(x) = \frac{3x-2}{x} = -\frac{2}{x} + 3$

6-138. See below:

a. Decreasing by 20% means you multiply by 0.8 each time, and the presence of a multiplier implies exponential.

b. $y = 23500(0.8^x)$

c. \$9625.60

d. ≈ 6.12 years

e. \$42,926.44

6-139. See below:

a. $x = \frac{1}{2}$

b. $x > 0$

c. $x = 10^{23}$

6-140. See below:

a. $x = 2.236$

b. $x = 4.230$

c. $x = 0.316$

d. $x = 2.021$

e. $x = 3.673$

6-141. See below:

a. 16

b. 12

c. $12^4 = 20736$


d. 54

e. No, they are not inverses (if they were, then the answers to parts (c) and (d) would have to be 2).

6-142. Square it and subtract 5; he dropped in a 76.

6-143. $c(x) = x^2 - 5$

6-144. $x = 17$

6-145. See below: 

a. $\frac{2(x+1)}{x+3}$

b. $\frac{3x^2-5x-3}{(2x+1)^2}$