2. [10 points]   Louis owns a small soda company and is experimenting with new flavors. Let $b(p)$ model the number of thousands of bottles of bacon-flavored soda sold by his company per month if he charges p cents per bottle. You may assume $b(p)$ is differentiable and invertible.

a. [2 points]   Give a practical interpretation of the statement $b^{-1}(8) = 150$.

Solution: In order to sell 8000 bottles of bacon-flavored soda per month, the company should charge 150 cents per bottle.

b. [3 points]   Give a practical interpretation of the statement $(b^{-1})'(4) = -10$.

Solution: In order to increase the number of bottles sold per month from 4000 to 5000, the company should lower the price about 10 cents.
If the company is currently selling 4000 bottles per month, lowering the price by 10 cents will increase sales by about 1000 bottles per month.
(There are other possible answers.)

c. [3 points]   Write an expression that is equal to the price (in cents) that the company would have to charge per bottle in order to sell twice as many bottles of bacon-flavored soda as it sells at a price of 125 cents per bottle.

Solution: $b^{-1}(2b(125))$

d. [2 points]   Which of the following is a correct formula for a function $h(d)$ that gives the number of thousands of bottles sold per month at a price of d dollars per bottle? (Circle your answer.)

$$h(d) = 100b(d) \qquad h(d) = \frac{b(d)}{100} \qquad \boxed{h(d) = b(100d)} \qquad h(d) = b\left(\frac{d}{100}\right)$$

3. [5 points]   Use the limit definition of the derivative to write an explicit expression for $r'(3)$ where $r(t) = (t+5)^{2t}$. Do not simplify or evaluate the limit. Your answer should not include the letter r.

Solution:

$$r'(3) = \lim_{h \to 0} \frac{(3+h+5)^{2(3+h)} - (3+5)^{2(3)}}{h}$$