Show your work for each of the following exercises. Circle your final answer.

1. Given the functions $f(x) = 3 + \sqrt{x + 5}$ and $g(x) = 2 + (x + 1)^2$, find these values:

a. $f(4)$ b. $f(g(-4))$ c. $g(2)$ d. $g(f(-1))$

2. The functions f and g are defined by these sets of input and output values:

$g = \{(1,2), (-2,4), (5,5), (6,-2)\}$

$f = \{(0,-2), (4,1), (3,5), (5,0)\}$

a. Find $g(f(4))$.   b. Find $f(g(-2))$.   c. Find $f(g(f(3)))$.

3. Jack and Sam decide to go out to the Hamburger Shack for lunch. They each have a 50-cent coupon from the Sunday newspaper for the Super-Duper-Deluxe $5.49 Value Meal. In addition, if they show their I.D. cards, they'll also get a 10% discount. Jack's server rang up the order as Value Meal, I.D. discount, and then coupon. Sam's server rang it up as Value Meal, coupon, and then I.D. discount.

a. How much did each guy pay?

b. Write a function, $C(x)$, that will deduct 50 cents from a price, x.

$C(x) =$

c. Write a function, $D(x)$, that will take 10% off a price, x.

$D(x) =$

d. Find $C(D(x))$. Then find $D(C(x))$.

e. Which server used $C(D(x))$ to calculate the price of the meal?

f. Is there a price for the Value Meal that would result in both guys paying the same amount after the discount and coupon are applied? If so, what is it?

4. Given the functions $f(x) = -x^2 + 2x + 3$ and $g(x) = (x - 2)^2$, find these values:

a. $f(g(3))$ b. $f(g(2))$ c. $g(f(1))$ d. $g(f(0.5))$

HONORS   e. $g(f(x))$ Simplify to remove all parentheses.

5. The functions f and g are defined by these sets of input and output values:

$g = \{(1,2), (-2,4), (5,5), (6,-2)\}$
$f = \{(2,1), (4,-2), (5,5), (-2,6)\}$

a. Find $g(f(2))$.

b. Find $f(g(6))$.

c. Select any number from the domain of either g or f, and find $f(g(x))$ or $g(f(x))$. Describe what is happening.