

Due: Thursday 9/25/08

1. Graph $f(x) = -x^2 + 4$
 - a. Explain why this is a function.
 - b. Give the domain and range.
 - c. Explain a situation that could be modeled with this function (use only the positive quadrant). Be specific, using exact features and values from the graph (y and x intercepts, maximum or minimum)

2. Andre rides his bicycle for 30 minutes at 20 mph. He then rests for 5 minutes, and rides again at 15 mph, for 25 minutes.
 - a. Write a piecewise function for total distance as a function of time: $d(t)$, that will describe Andre's motion. d = total miles, t = hours
 - b. Graph the function.
 - c. What is $d(\frac{2}{3})$? What does this mean in context?
 - d. How long does it take Andre to travel 12 miles?

3. **Notation reminder:** $f \circ g$ is the name for the composite function "f of g of x." That is, $(f \circ g)(x)$ means $f(g(x))$. Start with the innermost parentheses and work your way out.

Use the functions f , g , and h to answer each question.

$$f(x) = \frac{1}{x+5}$$

$$g(x) = \sqrt{x}$$

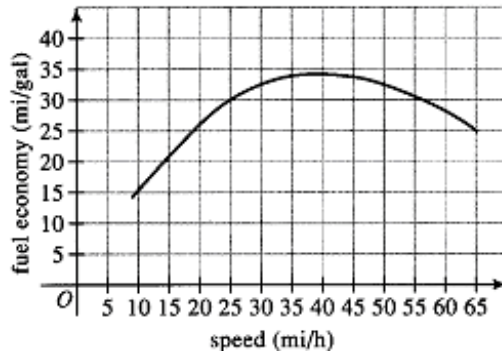
$$h(x) = x - 3$$

- a. Find $f(g(4))$
- b. Find $f(g(x))$
- c. Find $g(f(4))$
- d. Find $g(f(x))$
- e. Find $f(g(h(4)))$
- f. Find $f(g(h(x)))$
- g. Find $h(h(h(h(h(h(h(h(h(4))))))))))$

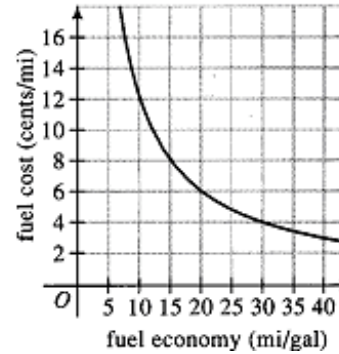
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4. Functions f and g are defined by the graphs below. Function f gives a car's fuel economy E as a function of the car's speed S . That is, $E = f(S)$. Function g gives the fuel cost per mile C as a function of fuel economy E . That is, $C = g(E)$.

Graph of f :



Graph of g :



- If the car is driven at 55 mi/h, what is the fuel cost? Show how to get the answer, using the function names f and g .
- If the fuel cost is to be kept at or below 4 cents per mile, at what speeds may the car be driven?
- Based on the meanings of the variables, which composite function makes sense, $f \circ g$ or $g \circ f$? Explain why your choice makes sense, and the other choice doesn't.
- Construct a table of values and a graph of the composite function that you chose in part c.