MTH 1410, FALL 2011

CHAPTER 1 REVIEW

1. Activity Description

Work out each problem on your own. After you have completed it (or become totally stuck), find someone else and introduce yourself. Compare your answers (or have them help you figure out the answer), then sign each other's papers and move on to the next problem.

2. Problems from Section 1.1

(1) The graph below shows the height of the water in a bathtub as a function of time. Give a verbal description of what you think happened.

(2) Let $f(x) = 4 + 3x - x^2$. Evaluate the difference quotient $\dfrac{f(3+h) - f(3)}{h}$ and simplify your answer.

(3) Sketch the graph of the function

$$f(x) = \begin{cases} x + 2 & \text{if } x \leq -1 \\ x^2 & \text{if } x > -1 \end{cases}$$

Do not use a graphing calculator.

(4) Find a formula for the described function and state its domain: A rectangle has perimeter 20 meters. Express the area of the rectangle as a function of the length of one of its sides.

3. Problems from Section 1.3

(5) The graph of f is given. Draw the graphs of the following functions:
   (a) $y = f(x) - 2$
   (b) $y = f(x + 1)$
   (c) $y = -2f(x)$

(6) Use the table to evaluate each expression:

x	1	2	3	4	5	6
f(x)	3	1	4	2	2	5
g(x)	6	3	2	1	2	3

(a) $f(g(1))$

(b) $g(f(1))$

(c) $g(g(1))$

(d) $(f \circ g)(6)$

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(7) A stone is dropped into a lake, creating a circular ripple that travels outward at a speed of 60 cm/s.

(a) Express the radius r of this circle as a function of the time t (in seconds).

(b) If A is the area of this circle as a function of the radius, find $A \circ r$ and interpret it (note: $A \circ r$ should be a function of t).

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4. Problems from Sections 1.5 and 1.6

(8) Under ideal conditions a certain bacteria population is known to double every three hours. Suppose that there are initially 100 bacteria.
   (a) What is the size of the population after 15 hours?
   (b) What is the size of the population after t hours?
   (c) Estimate the size of the population after 20 hours.
   (d) Estimate the time for the population to reach 50,000.

(9) Solve the equation for x.

$$e^{7-4x} = 6$$