EECS 20N: Structure and Interpretation of Signals and Systems   Sample Quiz
Department of Electrical Engineering and Computer Sciences   28 January 2011
UNIVERSITY OF CALIFORNIA BERKELEY

LAST Name _____ FIRST Name _____

LAB   Mon 12-3PM   Mon 3-6PM Tue 9-12PM Wed 12-3PM Thu 3-6PM Fri 9-12PM

- **(5 Points)** Print your name in legible, block lettering above and select lab time.

- This quiz should take up to 20 minutes to complete. You will be given at least 20 minutes—up to the end of today's lecture hour—to work on the quiz.

- **This quiz is closed book.** Collaboration is not permitted. You may not use or access, or cause to be used or accessed, any reference in print or electronic form at any time during the quiz. Computing, communication, and other electronic devices (except dedicated timekeepers) must be turned off. Noncompliance with these or other instructions from the teaching staff—*including, for example, commencing work prematurely or continuing beyond the announced stop time*—is a serious violation of the Code of Student Conduct.

- We will provide you with scratch paper. Do not use your own.

- **The quiz printout consists of pages numbered 1 through 3.** When you are prompted by the teaching staff to begin work, verify that your copy of the quiz is free of printing anomalies and contains all of the three numbered pages. If you find a defect in your copy, notify the staff immediately.

- Please write neatly and legibly, because *if we can't read it, we can't grade it.*

- For each problem, limit your work to the space provided specifically for that problem. *No other work will be considered in grading your quiz. No exceptions.*

- Unless explicitly waived by the specific wording of a problem, you must explain your responses (and reasoning) succinctly, but clearly and convincingly.

- We hope you do a *fantastic* job on this quiz.

Problem	Points	Your Score
Name, Lab	5	
1	16	
2	10	
Total	**31**	

Sample Quiz.1 (16 Points) Consider the following sets:

$$A = \{a\}, \qquad B = \{a, b\} \qquad C = \{a, b, c\} \qquad T = \{1, 2\} \, .$$

(a) Let $[B \to T]$ denote the set of all functions from B to T.

   (i) List all the elements of $[B \to T]$.

   (ii) How many elements are in $P([B \to T])$, the power set of $[B \to T]$?
        Specify one element of $P([B \to T])$ other than the empty set ϕ.

(b) Determine the truth or falsehood of each of the following assertions.
    If you find an assertion to be false, provide a counterexample by find-
    ing an element in the purported subset which is not a member of the
    purported superset. If you find an assertion to be true, prove that every
    element in the purported subset is a member of the purported superset.

   (i) $[A \to C] \subset [B \to C]$.

   (ii) $[A \to B] \subset [A \to C]$.

Sample Quiz.2 (10 points) Let the function $f : \mathbb{N}_0 \to \mathsf{V}$ be defined as follows:

$$\forall n \in \mathbb{N}_0 , \quad f(n) = 2n \,,$$

where $\mathbb{N}_0 = \{0, 1, 2, 3, \ldots\}$ is the set of nonnegative integers, and V is a subset of the real numbers $\mathbb{R}$.

(a) Is the function f one-to-one? Explain your reasoning succinctly, but clearly and convincingly.

(b) If you are told that f is onto, determine the set V.

You may use the blank space below for scratch work. Nothing written beyond this line will be considered in grading.