Quiz 2

EECS 203

Spring 2015

Name (Print): Key

uniqname (Print): key

Instructions. You have 25 minutes to complete this quiz. You may not use any sources of information, including electronic devices, textbooks, or notes. Leave at least one seat between yourself and other students. Please write clearly. If we cannot read your writing, it will not be graded.

Honor Code. This course operates under the rules of the College of Engineering Honor Code. Your signature endorses the pledge below. After you finish your exam, please sign on the line below:

I have neither given nor received aid on this examination, nor have I concealed any violations of the Honor Code.

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Total	**/30**

1) ***(10 points, -2 for each wrong/blank answer, minimum 0)***
For each of the following mappings indicate what type of function they are (if any). Use the following key:
   i) Not a function
   ii) A function which is neither onto nor one-to-one
   iii) A function which is onto but not one-to-one
   iv) A function which is one-to-one but not onto
   v) A function which is both onto and one-to-one

a) The mapping f from $\mathbb{R}^{+} to\ \mathbb{R}^{+}$ defined by $f(x) = -x$.
   i   ii   iii   iv   v

b) The mapping f from $\mathbb{R}^{+} to\ \mathbb{R}^{+}$ defined by $f(x) = 2x$.
   i   ii   iii   iv   v

c) The mapping f from $\mathbb{Z}^{+} to\ \mathbb{Z}^{+}$ defined by $f(n) = n + 1$.
   i   ii   iii   iv   v

d) The mapping f from $\mathbb{Z}\ to\ \mathbb{Z}$ defined by $f(n) = -n$.
   i   ii   iii   iv   v

e) The mapping f from $\mathbb{Z}\ to\ \mathbb{Z}$ defined by $f(n) = 1$.
   i   ii   iii   iv   v

f) The mapping f from $\mathbb{R}\ to\ \mathbb{Z}$ defined by $f(x) = \lceil x \rceil$.
   i   ii   iii   iv   v

g) The mapping f from $\mathbb{R}\ to\ \mathbb{R}$ defined by $f(x) = \frac{1}{x}$.
   i   ii   iii   iv   v

2) **(6 points, -2 per wrong circle/no circle, minimum 0)**
Circle each of the following which are true propositions.

a) If f and g are functions and f ° g is onto then f is onto

b) If f and g are functions and f ° g is onto then g is onto

c) $\forall S\ (\emptyset \subseteq P(S))$ (Where P(S) is the power set of S).

d) $\forall x \epsilon \mathbb{R} (x^2 \neq -4)$

3) **(6 points, -2 per wrong circle/no circle, minimum 0)**
Circle each of the following which are true propositions.

a) $(A \cup B = A) \rightarrow (B = \emptyset)$

b) $(A \cap B = A) \rightarrow (A \subseteq B)$

c) $(A \subseteq B) \rightarrow (|B| \geq |A|)$

d) $(|B| \geq |A|) \rightarrow (A \subseteq B)$

4) **(8 points)**
Prove that if $(p \wedge q), \mathrm{p} \rightarrow \neg(q \wedge r),\ s \rightarrow r$, then $\neg s$.

$$(1)(p \wedge q) \mid \text{Premise}$$
$$(2)p \mid \text{Simplification of } (1)$$
$$(3)\mathrm{p} \rightarrow \neg(q \wedge r) \mid Premise$$
$$(4)\neg(q \wedge r) \mid \text{Modens ponens } (2,3)$$
$$(5)\neg q \vee \neg r \mid \text{Demorgans } (4)$$
$$(6)q \mid \text{Simplification of } 1$$
$$(7)\neg r \mid \text{Disjunctive syllogism } (6,7)$$
$$(8)\ s \rightarrow r \mid Premise$$
$$(9)\ \neg s \mid Modus\ tollens\ (7,8)$$