Name: **Class ID:**

CSE 1400 Applied Discrete Mathematics

Fall 2013 Quiz 2

Score

1. (25 pts) Let

$$\mathbb{D} = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\} \text{ be the universe of digits}$$
$$\mathbb{E} = \{0, 2, 4, 6, 8\} \text{ be the even digits}$$
$$\mathbb{O} = \{1, 3, 5, 7, 9\} \text{ be the odd digits}$$
$$\mathbb{P} = \{2, 3, 5, 7\} \text{ be the prime digits.}$$

(a) What is the set $\mathbb{E} \cap \mathbb{O}$?

(b) Is $\mathbb{O} \cup (\mathbb{E} \cap \mathbb{P}) = (\mathbb{O} \cup \mathbb{E}) \cap \mathbb{P}$ `True` or `False`? Explain your answer.

(c) Verify De Morgan's law: $\neg(\mathbb{O} \cap \mathbb{P}) = \neg\mathbb{O} \cup \neg\mathbb{P}$

(d) What is $|\mathbb{D}|$?

(e) What is $2^{\mathbb{D}}$?

Score

2. (20 pts) I once gave a 20 question `True`/`False` exam.

   (a) In how many ways can you answer the questions (pretend you answer each question `True` or `False`)?

   (b) If you decide to leave some questions blank, in how many ways can you answer the questions?

   (c) If you decide to answer one-half of the questions `True` and one-half `False`, in how many ways can you answer the questions?

   (d) In how many ways could the questions be partitioned into 3 subsets: Those answered `True`, those answered `False`, and those left blank.

Score

3. (5 pts) With respect to sets and subsets, what does the number $\binom{12}{5}$ represent?

Score

4. (10 pts) What is Pascal's identity and what are its boundary conditions?

Score

5. (10 pts) What is the sum of values in row n in Pascal's triangle? Why is it this expression?

Score

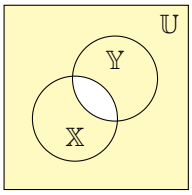
6. (10 pts) Let $\mathbb{X} = \{a, b, c, d, e\}$.

   (a) List a partition of $\mathbb{X}$ into 3 subsets.

   (b) What is the notation for the number of partitions of $\mathbb{X}$ into 3 subsets?

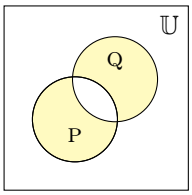
Score

7. (5 pts) Here is a Venn diagram. What set expressions does the shaded region represent?



Score

8. (5 pts) What Boolean expression does the shaded region represent?

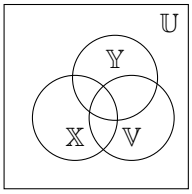


Score

9. (5 pts) How many different 3-variable Boolean functions are there?

Score

10. (5 pts) In how many ways could you shade the 3-circle Venn diagram?



Total Points: 100 Monday, September 16, 2013