Discrete Mathematics Quiz 11

Name: _____

NYU Net ID: _____

Each question carries one point. Please do all 5 questions on both sides of the paper. Total will be best 4 out of 5.

1.1) A bank PIN is a string of four digits, each digit 0-9. How many choices are there for a PIN if the last digit must be odd and all the digits must be different from each other?

*a. $9 \cdot 8 \cdot 7 \cdot 5$

b. $5 \cdot 10^3$

c. $10 \cdot 9 \cdot 8 \cdot 5$

d. $10 \cdot 9 \cdot 8 \cdot 7$

1.2) A particular state's license plates have 7 characters. Each character can be a capital letter, or a digit except for 0. How many license plates are there in which no two adjacent characters are the same?

*a. $35 \cdot (34)^6$

b. $(34)^7$

c. $35 \cdot 34 \cdot 33 \cdot 32 \cdot 31 \cdot 30 \cdot 29$

d. $(35)^7$

1.3) A country has two political parties, the Reds and the Blues. The 100-member senate has 44 Reds and 56 Blues. Each party must elect a chair and a vice chair from their party's members, and one person cannot be elected for both. How many different outcomes are there for the chair and vice chair elections?

a. $100 \cdot 99 \cdot 98 \cdot 97$

*b. $44 \cdot 43 \cdot 56 \cdot 55$

c. 100^4

d. $44^2 \cdot 56^2$

2.1) There is a set of 10 jobs in the printer queue. Two of the jobs in the queue are called job A and job B. How many ways are there for the jobs to be ordered in the queue so that job A completes some time before job B?

*a. $\frac{10!}{2}$

b. $2 \cdot 9!$

c. $9!$

d. $10!$

2.2) There is a set of 10 jobs in the printer queue. Two of the jobs in the queue are called job A and job B. How many ways are there for the jobs to be ordered in the queue so that either job A or job B finish last?

a. $\frac{10!}{2}$

*b. $2 \cdot 9!$

c. $9!$

d. $10!$

2.3) There is a set of 10 jobs in the printer queue. One of the jobs in the queue is called job A. How many ways are there for the jobs to be ordered in the queue so that job A is the first to finish or the last to finish?

a. $\frac{10!}{2}$

*b. $2 \cdot 9!$

c. $9!$

d. $10!$

3.1) A country has two political parties, the Reds and the Blues. The 100-member senate has 44 Reds and 56 Blues. How many ways are there to pick a 10 member committee of senators with the same number of Reds as Blues?

a. $(\frac{44}{10}) \cdot (\frac{56}{10})$

b. $(\frac{100}{10})$

c. $(\frac{44}{5}) + (\frac{56}{5})$

*d. $(\frac{44}{5}) \cdot (\frac{56}{5})$

3.2) How many strings of length 10 over the alphabet {a, b, c, d} have exactly 3 a's?

a. $(\frac{10}{3})$

b. 4^7

*c. $(\frac{10}{3}) \cdot 3^7$

d. $(\frac{10}{3}) \cdot 4^7$

3.3) Natasha and Rodrigo are in a class of 30 students that selects 4 leaders. How many ways are there to select the 4 leaders so that either Natasha and Rodrigo are both selected or Natasha and Rodrigo are both not selected?

*a. $(\frac{28}{2}) + (\frac{28}{4})$

b. $(\frac{28}{2}) + (\frac{30}{4})$

c. $(\frac{30}{2}) + (\frac{28}{4})$

d. $(\frac{30}{2}) + (\frac{30}{4})$

4.1) A state's license plate has 7 characters. Each character can be a capital letter (A-Z), or a digit except for 0 (1-9). How many license plates are there in which exactly 3 of the 7 characters are digits?

a. $(\frac{7}{3}) \cdot (35)^4$

b. $P(7,3) \cdot (35)^4$

c. $(\frac{7}{3}) \cdot (26)^4$

*d. $(\frac{7}{3}) \cdot 9^3 \cdot (26)^4$

4.2) A state's license plate has 7 characters. Each character can be a capital letter (A-Z), or a digit except for 0 (1-9). How many license plates are there in which exactly 2 of the 7 characters are digits?

a. $(\frac{7}{2}) \cdot (35)^5$

b. $P(7,2) \cdot (35)^5$

c. $(\frac{7}{2}) \cdot (26)^5$

*d. $(\frac{7}{2}) \cdot 9^2 \cdot (26)^5$

4.3) 10 identical copies of a movie will be stored on 40 computers such that each computer has at most 1 copy. How many different ways can the 10 copies be stored?

a. $P(40,10)$

b. 10^{40}

*c. $(\frac{40}{10})$

d. 40^{10}

4.4) 10 different movies will be stored on 40 computers such that each computer will have at most one movie. Since the movies are different, it matters which movie is stored on which computer. How many different ways can the 10 movies be stored?

*a. $P(40,10)$

b. 10^{40}

c. $(\frac{40}{10})$

d. 40^{10}

5.1) How many 10-bit strings begin with “101” or “00”?

*a. $2^7 + 2^8$

b. $2^{10} + 2^{10}$

c. $2^7 \cdot 2^8$

d. $2^{10} \cdot 2^{10}$

5.2) A bank PIN is a string of four digits, each digit 0-9. How many choices are there for a PIN if the last digit must be odd?

a. 10^4

b. 4^{10}

c. $5 \cdot 3^{10}$

*d. $5 \cdot 10^3$