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Test III Version A

ICS 6D Winter 2017 March 3, 2017 Instructor: Sandy Irani

Instructions

- Wait until instructed to turn over the cover page.
- There are 25 questions, each worth 1 point. There is no partial credit.
- Leave your answer as an arithmetic expression, including the P(n, k), n!, or $\binom{n}{k}$ notation. You will get full credit as long as the expression evaluates to the correct answer. You can not use "..." in your answers.
- Circle your answer to each question. You should have only one expression inside the circle for each question. We will score the question based only on the value of the expression inside the circle.
- **Important:** There are questions on both sides of the page. The back of the last page is for scratch work.

1. A password can be any string of length 7, 8, or 9. Each character in the password can be any capital letter or any digit. There are no other restrictions on the password. How many possible different passwords are there?

2. There are 30 singers in a school choir. 20 of the singers are women, and the other 10 are men. The choir director must select 12 singers from the choir to be in the honors choir. How many ways are there to select the honors choir if there must be at least one man in the honors choir?

3. How many strings over the alphabet $\{a, b, c, d, e\}$ of length 13 have exactly four c's?

4. 30 girls audition for a play. There are four different female roles in the play. How many possible outcomes are there for the auditions? Note that it is important which girl gets assigned which part.

5. A blue die and a red die are thrown. Each die has six sides, labeled 1 through 6. The dice are fair, so each outcome is equally likely. What is the probability that the sum of the values on the two dice equals 6?

6. Ten kids line up for recess. There are five boys and five girls. How many ways are there for the 10 kids to line up so that all the boys are ahead of all the girls? That is, none of the girls are ahead of any of the boys.

7. How many binary strings of length 12 have six 1's or seven 1's?

8. A local restaurant offers 19 varieties of entrees. An order is placed for 6 different entrees. No two entrees in the order are the same. How many choices are there for the order?

9. A chef is deciding on the schedule for the week of lunch specials for her restaurant. She makes 22 different dishes that she can put on the schedule. For each of the seven days of the week, she must select one dish for the lunch special. How many ways are there for her to select the schedule for the week if she does not select the same dish more than once? Note that it matters which dish is served on which day for the schedule of daily specials.

10. A PIN is a string of four digits. Each of the four digits can be any digit from the set $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, except that the last digit must be even and the second-to-last digit must be odd. (Note that 0 is even.) How many different choices are there for a PIN?

11. There are 30 singers in a school choir. The choir director must select 10 singers from the choir to be in the honors choir. How many ways are there for the director to select the honors choir?

12. There are 30 singers in a school choir. 20 of the singers are women and the other 10 are men. The choir director must select 12 singers from the choir to be in the honors choir. How many ways are there to select the honors choir if there must be the same number of women as men in the honors choir?

13. 11 student are in a waitlist for a course. Two of the students in the list are named Ed and Ned. How many different ways are there for the students to be ordered in the list so that Ed is higher in the list than Ned?

14. A PIN is a string of four digits. Each of the four digit can be any digit from the set {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}, except that the last digit must be even and the second-to-last digit must be odd. (Note that 0 is even.) Furthermore, all four digits in the PIN must be different from each other. How many different choices are there for a PIN?

15. A handyman service has a team of 12 workers available on a particular day. There are five different jobs that need to be done that day. Each job requires exactly one worker and no worker can do more than one job. How many ways are there to assign workers to jobs? Note that it matters who gets assigned to which jobs.

16. A green, a red, and a blue die are thrown. Each die has six sides labeled 1 through 6. The dice are fair, so each outcome is equally likely. What is the probablity that at least one of the dice comes up six?

17. A string of length 11 is selected whose characters are all capital letters. How many possibilities are there for the string if the characters in the string are all different from each other? That is, no letter appears more than once in the string.

18. A teacher distributes 5 idential homework passes to her class of 20 students. No student can get more than one pass. How many ways are there for her to distribute the passes?

19. How many strings of length 12 over the alphabet $\{A, B, C, D, E, F\}$ have exactly three A's and exactly two B's?

20. A coin is flipped 12 times. What is the probability that at least one of the flips comes up heads?

21. There are 32 applicants who apply for a job. Five of the applicants are selected for an interview. How many ways are there to select the applicants who will get an interview?

22. $S = \{a, b, c, d, e, f, g\}$. What is |P(S)|?

23. 11 student are in a waitlist for a course. Two of the students in the list are named Ed and Ned. How many different ways are there for the students to be ordered in the list so that either Ed or Ned is first?

24. A coin is flipped 10 times. The coin is a fair coin so each outcome is equally likely. What is the probability that the number of flips that come up heads is **not** equal to 4?

25. How many binary strings of length 12 start with 101 or 1110?

This area is for scratch work.