Student's Name **[print]**	Section	Student Number

Mathematics 028b Test 1 **CODE 111** **Wednesday January 26, 2005**
45 minutes

INSTRUCTIONS: Fill in the top of this page and the top of the scantron answer sheet *completely*. You must both *print* and *code* your student number, section number, and exam code (e.g., 111) on the answer sheet. **All** materials (question sheet, answer sheet, rough work) must be handed in. This question sheet will be returned to you. Circle the answer to each question on this page and code the answer on the scantron sheet. **No extra time** will be given for coding your answers, so do it as you go along. You must use an HB pencil to fill in the scantron answer sheet. Calculators may be used.

Use the following information for questions 1 and 2.

All of the individual pieces of paper in a certain professor's office can be classified by location: as "Put away in a file or drawer" (set P), as "loose on the Desk" (set D) or as "in a pile on the Floor" (set F).

Alternatively, these same pieces of paper, whether or not they are "put away", can be classified by their importance in any of 3 ways: as "still Important" (set I), as "useful as Scrap paper" (set S) or as "should be Recycled" (set R).

1. Which of the following is the set of all unfiled important pieces of paper which are loose on the desk?

A: $P^c \cup I \cup D$	B: $P^c \cup (I \cap D)$	C: $I \cap D$	D: $I \cup (P^c \cap D)$	E: $(P \cap R)^c$

2. Which of the following statements about the set $P^c \cap R$ is **not** true?

A: None of these pieces of paper is important.
B: Some of these pages are useful as scrap paper.
C: None of these pieces of paper is in a file.
D: There may be some of these pieces of paper loose on the desk.
E: None of these pages has been put away.

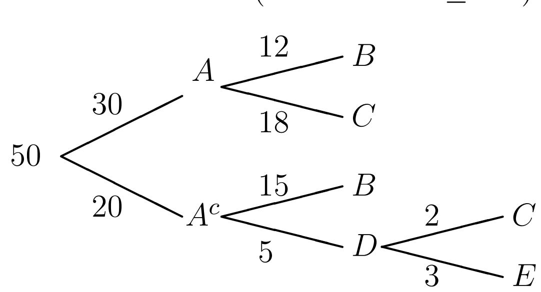
3. There are 100 students in a certain math class. Let M be the set of all male students in the class and P be the set of all students who are passing the class. If there are 57 men in this class and 80% of the students in the class are passing, including 48 of the men, find $n(M \cup P)$.

A: 45.6	B: 89	C: 48	D: 137	E: 91

4. Fred and Sam are going to play a "best 2 out of 3" match of the card game Cribbage. That is, they will play until one of them has won 2 games. (In Cribbage, there is always a winner; it is not possible for a game to end in a tie.) Considering the number of games played and who wins each game, in how many distinct ways could the Cribbage match turn out? (i.e. how many different sequences of games are possible?)

A: 2	B: 4	C: 5	D: 6	E: 8

5. Consider the counting tree shown below. (Note that $D \subseteq A^c$.) Find $n(C \cap D)$.



A: 2	B: 5	C: 20	D: 21	E: 23

6. A small multi-plex movie theatre has 4 different movies showing. All of these movies start at roughly the same time. Three groups of people arrive at the theatre. In how many different ways could these 3 groups each choose a movie to see?

A: $4!$	B: $3!$	C: $\binom{4}{3}$	D: 3^4	E: 4^3

7. In how many distinct ways can some 4 out of a set of 6 different display plates be arranged (in a row) on a shelf?

A: 15	B: 24	C: 30	D: 360	E: 720

8. In how many distinct ways can 6 children be arranged in a circle to play a counting game?

A: 5	B: 6	C: $5!$	D: $6!$	E: $7!$

9. In how many distinct ways could 3 boys and 4 girls be arranged on a bench so that the girls are all sitting together?

A: $7!$	B: $4!$	C: $4! \times 3!$	D: $4! \times 3! \times 2$	E: $4! \times 4!$

10. Eugene has 4 mystery novels and 5 science fiction novels which he wants to read. In how many distinct ways can he choose 3 of these books to take with him on vacation next week?

A: $\binom{9}{3}$	B: $\binom{4}{3} + \binom{5}{3}$	C: $\binom{4}{3} \times \binom{5}{3}$	D: $\frac{9!}{3!}$	E: $\frac{9!}{6!}$

11. Matt has to choose 5 courses for next term. He must choose 3 courses from a list of 6 in his major area of study. He must also take 1 of 3 Math courses. His last course can be any 1 of 10 elective courses. In how many distinct ways can Matt choose courses for next term?

A: $\binom{6}{3} + \binom{3}{1} + \binom{10}{1}$	B: $\frac{6!}{3!} + \frac{3!}{1!} + \frac{10!}{1!}$	C: $6 \times 3 \times 10$	D: $\binom{6}{3} \times \binom{3}{1} \times \binom{10}{1}$	E: $\frac{6!}{3!} \times \frac{3!}{1!} \times \frac{10!}{1!}$

12. Mary also has to choose 5 courses for next year. The normal requirements for her programme would have her take any 3 of 4 courses in her major area and any 2 from a list of 7 elective courses (2 of which are Economics electives). However, if she decides to declare a minor in Economics, then she only needs to take (any) 2 of the 4 courses in her major area, but must also take a specified Economics course (which is not one of the electives) and must take one of the 2 Economics electives. Her fifth course would be chosen from the list of 5 non-Economics elective courses. In how many distinct ways can Mary choose courses for next year?

A: 39	B: 144	C: 350	D: 1254	E: 5040

13. In how many distinct ways can the letters of the word BABBOON be arranged?

A: $7!$	B: $3!2!1!1!4!$	C: $\binom{7}{3\ 2\ 2}$	D: $\binom{7}{3\ 2\ 1\ 1}$	E: $\binom{7}{3}\binom{7}{2}\binom{7}{1}\binom{7}{1}$

14. Claire is on vacation in New Zealand. She has purchased 8 different postcards and will send 2 to each of 4 different people. Without considering the order in which she sends them, in how many different ways can she decide *which* 2 postcards to send to each person?

A: $\binom{8}{2\ 2\ 2\ 2}$	B: $\binom{8}{2\ 2\ 2\ 2} \div 4!$	C: $\binom{8}{4\ 4}$	D: $\binom{8}{4\ 4} \div 2$	E: $8! \div 4!$

15. Claire has just returned from her New Zealand vacation. She bought herself 8 small statuettes of Maori (New Zealand native people), each in a different position. She wants to display them in 2 groups of 4. In how many distinct ways can she divide the statuettes into display groups?

A: $\binom{8}{2\ 2\ 2\ 2}$	B: $\binom{8}{2\ 2\ 2\ 2} \div 4!$	C: $\binom{8}{4\ 4}$	D: $\binom{8}{4\ 4} \div 2$	E: $8! \div 4!$