1. ⎡10 pts.⎤ A traffic light is red for 25 sec, yellow for 5 sec, and green for 55 sec. What is the probability that when you reach the light it will be yellow?

2. ⎡10 pts.⎤ One card is selected at random from a deck of cards. Find the probability that the card selected is not a 5.

3. ⎡10 pts.⎤ A die is tossed. Find the odds against rolling a number less than 3.

4. ⎡10 pts.⎤ The odds in favor of Wendy winning a scholarship are 7:4. Find the probability that Wendy wins.

5. ⎡10 pts.⎤ A 15-sided die is rolled once. If an even number comes up you win $10; if a 1 or 3 comes up you lose $6; if a 5, 7, 9, or 11 comes up you lose $1; if a 13 comes up you lose $50; and if a 15 comes up you break even. What's your expected value if you play this game?

6. ⎡10 pts. each⎤ A multiple-choice exam has five possible answers for each question. For each correct answer you get 10 points. For each wrong answer you lose 3 points. For answers left blank, no points are gained or lost.

   (a) If you don't know the correct answer to a question, is it to your advantage to guess? Explain.

   (b) If you don't know the correct answer to a question but can eliminate two possible choices, is it to your advantage to guess? Explain.

7. ⎡10 pts. each⎤ Ziltoid will take 3 courses during the spring: an elective, a mathematics course, and a physics course. The available choices are:

Elective	Math	Physics
Bee Keeping	Topology	General Relativity
Soothsaying	Geometry	Quantum Mechanics
	Algebra	Thermodynamics

   (a) Make a tree diagram

   (b) What's the probability Ziltoid will take bee keeping *and* algebra?

   (c) What's the probability Ziltoid will take geometry *or* quantum mechanics, but not soothsaying?

8. ⎡10 pts.⎤ One card is selected from a deck of playing cards. Find the probability of selecting a king or a club.

9. ⎡10 pts. each⎤ Two cards are selected at random. Find the probability the first shows a 2 and the second shows a queen

   (a) with replacement.

   (b) without replacement.

10. ⎡10 pts.⎤ Each question of a six-question multiple-choice exam has four possible answers. Oliver Windybum picks an answer at random for each question. Determine the probability that he selects the correct answer on only the third and fourth questions.

11. ⎡10 pts. each⎤ Consider the data below giving the ages of a sample of Vulcan citizens.

Age	Male	Female	Total
0-60	41	30	71
61-120	109	85	194
over 120	21	14	35
Total	171	129	300

If an individual is selected at random, find the probability that the person is

   (a) 0-60 years old, given the person is male.

(b) Female, given the person is over 120.

(c) 61-120 or over 120, given the person is male.

12. ☐ 10 pts. each Assume that a password to log onto a computer account is to consist of four letters followed by two digits. Determine the number of possible passwords if

(a) repetition is not permitted.

(b) repetition is permitted.

13. ☐ 10 pts. A bank has three drive-through stations. Assuming that each is equally likely to be selected by customers, in how many different ways can the next 10 drivers select a station?

14. ☐ 10 pts. Determine the total number of possible permutations of the letters in the word ONOMATOPOEIA.

15. ☐ 10 pts. Professor Sprout bought a package of 28 different plants, but she only needed 22 plants for planting. In how many ways can she select the 22 plants from the package to be planted?

16. ☐ 10 pts. A teacher is making a test consisting of 12 questions. She has a pool of 38 questions, of which 18 are hard, 12 intermediate, and the rest easy. How many different 12-question tests can be made from the 38 questions if the test is to have 6 hard, 4 intermediate, and 2 easy questions?

17. ☐ 10 pts. The numbers 0 through 12 are put in a hat on slips of paper. If four slips are selected at random, what's the probability that the four numbers selected are greater than 5?

18. ☐ 10 pts. A game show has 7 doors, of which the contestant must pick 2. Behind 2 doors are cars, and behind the other 5 doors are solar-powered sun dials. A contestant wins what's behind the chosen doors. Determine

the probability that the contestant wins

(a) both cars.

(b) at least one car.

19. ☐ 10 pts. A pair of aces and a pair of 8's is known as a "dead man's hand." Determine the probability of being dealt a dead man's hand (any two aces, any two 8's, and one other card that is not an ace or an 8) when 5 cards are dealt without replacement.

20. ☐ 10 pts. A quality control engineer at the Illuminati lightbulb plant finds that 0.4% of its bulbs are defective. Determine the probability that exactly 2 of the next 12 bulbs made are defective.

21. ☐ 10 pts. each Mortimer McDoogalhauser has to take a ten question multiple-choice quiz in his elementary stage lighting class. (It's important to know when to shine a light in Captain Kirk's eyes when he begins a rousing speech about how "Men must have challenges to be men.") Each question has five choices, with one being correct. Assuming Mr. McDoogalhauser guesses on all ten questions on account of being too hung over from the previous night's carousing about town and engaging in fisticuffs over the finer points of stage lighting theory with a biker gang, find the probability that he will answer

(a) exactly half the questions correctly.

(b) at least nine questions correctly.

(c) at least one question correctly.