$\qquad$
$\qquad$
$\qquad$

## Help can be found in class lecture, topics review or related PowerPoints

a) What are the keywords for using addition rule and what is its formula?
b) What is mutually exclusive or disjoint events?
c) What are the 4 steps in counting problems?
d) What are the formulas for factorial, combination and permutation?
e) What is the key difference between combination and permutation?
f) What is the definition of random variable?
g) What is the difference between discrete and continuous random variable? Cite two examples for each.
h) What is the probability distribution table?
i) To construct a probability distribution table, how many columns are needed and what must be the heading for each column?
j) The summation of what column in probability distribution must add to one?
k) What is the formula to find mean or expected value for a probability distribution?

1) The summation of what column in probability distribution results in mean or expected value?
m) How can we use TI calculator to compute mean or expected values for a probability distribution?
2) Reading Time and Newsweek.

Given: $\mathrm{P}($ Reading Newsweek $)=.20, \mathrm{P}($ Reading Time $)=.25, \mathrm{P}(\mathrm{N}$ and T$)=.05$

1) $40 \%$

Question: What is the probability of being either a Time or Newsweek reader?
2) Table bellows are surveys from 1000 people about Smoking and having Cancer

|  | (smoker) | (non-smoker) |  |
| :--- | :---: | :---: | :---: |
| (cancer) | 100 | 50 | $\mathbf{1 5 0}$ |
| (no cancer) | 300 | 550 | 850 |
|  | $\mathbf{4 0 0}$ | $\mathbf{6 0 0}$ | $\mathbf{1 0 0 0}$ |

If one person is selected, then find
a) The probability the person has cancer

2-a) $15 \%$
b) The probability the person is smoker

2-b) ?
c) The probability the person is smoker and have cancer

2-c) 10\%
d) The probability the person is smoker or have cancer

2-d) ?
e) The probability the person has not cancer and is not a smoker

2-e) $55 \%$
f) The probability the person has not cancer or is not a smoker

2-f) ?
g) The probability the person has not cancer or is a smoker

2-g) $95 \%$
h) The probability the person has cancer or not

2-h) ?
3) At a convention there are 7 math instructors, 5 computer science instructors, 3 statistics instructors and 4 science instructors. If an instructor is selected at random, find the probability of selecting a math or science instructor.
4) In a statistics class there are 18 juniors and 10 seniors; 6 of the seniors are females and 12 of the juniors are males. If a student is selected at random, find the probability of selecting the following:

|  | Juniors | Seniors |  |
| :--- | :---: | :---: | :---: |
| Female | 12 | 6 | $\mathbf{1 8}$ |
| Male | 6 | 4 | $\mathbf{1 0}$ |
|  | $\mathbf{1 8}$ | $\mathbf{1 0}$ | $\mathbf{2 8}$ |

a) $\mathrm{P}(\mathrm{a}$ junior or a female $)$

4-a) $86 \%$
b) P (a senior or a female)

4-b) $78 \%$
c) P (a junior or a senior)

4-c) ?
5) A grocery store employs cashiers, stock clerks, and deli personnel. The distribution of employees according to marital status is shown here

|  | Cashier | Stock Clerk | Deli personnel |  |
| :--- | :---: | :---: | :---: | :---: |
| Married | 8 | 12 | 3 | 23 |
| Not Married | 5 | 15 | 2 | 22 |

If an employee is selected at random, find the following probabilities:

| a) The employee is a stock clerk or married. | 5-a) $84 \%$ |
| :---: | :---: |
| b) The employee is not married | 5-b) $49 \%$ |
| c) The employee is a cashier or is not married | 5-c) $67 \%$ |
| 6) |  |
| a) Find ${ }_{6} P_{4} \times{ }_{7} C_{5}=$ | 6-a) 7,560 |
| b) Find ${ }_{5} P_{2} \times{ }_{5} C_{2}=$ | 6-b) 200 |
| c) Find ${ }_{5} P_{0} \times{ }_{5} C_{0}=$ | 6-c) 1 |
| d) In how many ways Moe can dress up, if he has 10 shirts, 5 pants, and 4 pair of shoes? | 6-d) 200 |
| e) How many different 3-letter words can be written not ending with letters (f,i,g,h,te, r) ? | 6-e) 12,844 |
| f) If a password should consist of 2 letters first and 3 digits after, then how many different passwords are possible? | 6-f) $\mathbf{6 7 6 , 0 0 0}$ |
| g) How many ways can a president and a treasurer be selected in a club of 10 members? | 6-g) 90 |
| h) In how many ways can we select 3- member committee from a group of 8 people? | 6-h) 56 |
| i) How many ways can a president, vice-president, and a treasurer be selected in a club with 12 members? | 6-i) 1,320 |
| j) In how many ways a teacher can select 5 of his 23 students for a fieldtrip? | 6-j) 33,649 |

k) To create your own burger, there are 2 different kinds of cheese, 3 different breads, and 3 different sauces he can choose from, and three choice of cooking and having tomato or lettuce, but you can only choose one of each category. How many different ways can he create this burger?

6-k) 108
l) Diane is ordering pizza for her family. There are 4 different possible sizes of the pizza. Also, she has to choose one of 5 toppings to place on the pizza and one of 3 different types of cheese for the pizza. In addition, she must choose one of 3 different kinds of crust. How many different ways can she have her pizza?

6-1) 180
m) How many 3 -digit odd numbers can be formed from the digits $0,2,3,4,5,7$ and 9 ?

6-m) 168

7 Let Random Variable $\mathbf{X}=$ the number of accidents at the city of Roseville in a given day for the last 50 days.

| $\mathbf{B}$ |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{x}$ | $\mathbf{f}$ | $\mathbf{P}(\mathbf{x})$ | $\mathbf{x ~ P} \mathbf{( x )}$ |  |  |  |
| 3 | 11 | $\mathbf{0 . 2 2}$ | $\mathbf{0 . 6 6}$ |  |  |  |
| 4 | 10 |  |  |  |  |  |
| 5 | 9 | $\mathbf{0 . 1 8}$ | $\mathbf{0 . 9 0}$ |  |  |  |
| 6 | 8 |  |  |  |  |  |
| 7 | 5 | $\mathbf{0 . 1 0}$ | $\mathbf{0 . 7 0}$ |  |  |  |
| 8 | 4 |  |  |  |  |  |
| 9 | 2 | $\mathbf{0 . 0 4}$ | $\mathbf{0 . 3 6}$ |  |  |  |
| 10 | $1+$ |  |  |  |  |  |
| $\mathbf{5 0}$ |  |  |  |  | $\mathbf{1 . 0 0 = ?}$ | $\sum x p(x)=$ |
|  | Mean $=$ |  |  |  |  |  |



- Complete the table, draw probability distribution and find the probability that,
a) At least there will be 6 accidents occurs in a given day.

7-a) 0.40
b) At most there will be 7 accidents occurs in a given day.

7-b) 0.86
c). Find the mean of number of accidents occurs in a given day.

7-c) 5.22
8) In a game, you have a 1 probability of winning $\$ 120$ and a 49 probability of losing $\$ 6$.

| W |  |  |  |
| :---: | :---: | :---: | :---: |
| L |  |  |  |
|  |  |  | $\mathbf{- \$ 3 . 4 8}$ |

9) Suppose you pay $\$ 2.00$ to roll a fair die with the understanding that you will get back $\$ 4.00$ for
10) $\$ 0$ rolling a 3,5 or a 4 , nothing otherwise. What is your expected value of your gain or loss?

| W |  |  |  |
| :---: | :---: | :---: | :---: |
| L |  |  |  |
|  |  |  | $\mathbf{0}$ |

10) Suppose you buy 10 tickets for $\$ 1$ out of a lottery of 1000 tickets where the prize for the
11) $\$ 0$ one winning ticket is to be $\$ 1000$. What is your expected value?

| W |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L |  |  | $\mathbf{\$ 0}$ |  |  |  |
|  |  |  |  |  |  |  |

11) On a multiple-choice test, a student is given four possible answers for each question. The student
12) 0.0625 receives 1 point for a correct answer and loses $1 / 4$ point for an incorrect answer. If the student has no idea of the correct answer for a particular question and merely guesses, what is the student's expected gain or loss on the question?

| Correct |  |  |  |
| :---: | :--- | :--- | :--- |
| Incorrect |  |  |  |
|  |  |  | $\mathbf{0 . 0 6 2 5}$ |

12) Suppose also that on one of the questions you can eliminate two of the four answers as being wrong.
13) 0.375 If you guess at one of the remaining three answers, what is your expected gain or loss on the question? What is your expected value?

| Correct |  |  |  |
| :---: | :--- | :--- | :--- |
| Incorrect |  |  |  |
|  |  |  | $\mathbf{0 . 3 7 5}$ |

13) A contractor is considering a sale that promises a revenue of $\$ 38,000$ with a probability of 0.7 or a loss (due to bad weather, strikes, and such) of $\$ 18,000$ with a probability of 0.3 . What is the expected profit?
14) $\$ 8,600$

| Profit |  |  |  |
| :---: | :---: | :---: | :---: |
| Loss |  |  |  |
|  |  |  | $\$ 8,600$ |

14) Suppose that you want to insure a laptop computer, an iPhone, a trail bike, and your text-books. Table gives the values of these items and the probabilities that these items will be stolen over the next year.

|  | Value | Probability of being stolen |  |
| :--- | :---: | :---: | :---: |
| Laptop | $\$ 2000$ | $2 \%$ | $\$ 40$ |
| iPhone | $\$ 600$ | $3 \%$ | $\$ 18$ |
| Trail bike | $\$ 700$ | $1 \%$ | $\$ 7$ |
| Text Books | $\$ 800$ | $4 \%$ | $\$ 32$ |

a) Predict what the insurance company can expect to pay in claims on your policy. $\mathbf{\$ 9 7}$
b) Is $\$ 100$ a fair premium for this policy? Yes

