

	Assignment #(2)
Q#(1).	The probability of getting caught copying someone else's exam is 0.2, find the probability of not getting caught in 3 attempts. Assume independence. (Ans. 0.512)
Q#(2).	Large lots of incoming products at a manufacturing plant are inspected for defective items by means of a sampling. Ten items are to be examined and the lot rejected if 2 or more defectives are observed. If a lot contains exactly 5% defective items what is the probability that the lot will be accepted (Ans. 0.9139)
Q#(3).	India and Pakistan cricket teams will play 5 one day match series next year, on the basis of previous matches record the probability of winning a match against Pakistan by India is 40% what is the probability that that Pakistan will win the series (Assuming that there is no tie or abandoned match) (Ans. 0.6826)
Q#(4).	Suppose that the internal revenue service will audit 20% of income tax returns reporting an annual gross income of over \$80,000. What is the probability that of 15 such returns, at most four will be audited? (Ans. 0.8358)
Q#(5).	A manufacturing process produces 6 defective items out of 100. To control quality, each day a sample of 10 completed items is selected at random and inspected. If the sample produces more than 2 defective items, then the whole's output is inspected, and the manufacturing process is reviewed. What is the probability of this happening (Ans 0.0188)
Q#(6).	Suppose that 9 people, chosen at random, are asked if they favor a certain proposal. Find the probability that a majority of the persons polled will favor the proposal, given that 45 % of the population favor the proposal (Ans. 0.3786)
Q#(7).	Suppose a warship takes 10 shots at a target and it takes at least 4 hits to sink it. If the warship has a record of hitting with 20 % of its shots, in the long run. What is the chance of sinking the target? (Ans 0.1209)

Q#(8).	Large lots of incoming products at a manufacturing plant are inspected for defectives by means of a sampling scheme. 8 items are to be examined and the lot rejected if 2 or more defectives are observed. If a lot contains 90% good items what is the probability that the lot will be rejected. (Ans. 0.1869)
Q#(9).	Seventeen people have been exposed to a particular disease. Each one independently has a 40% chance of contracting the disease. A hospital has the capacity to handle 5 cases of the disease. What is the probability that the hospital has no capacity to handle the patients (Ans. 0.7361)
Q#(10).	There are 10 patients on the Neo-Natal Ward of a local hospital who are monitored by 2 staff members. If the probability (at any one time) of a patient requiring emergency attention by a staff member is 0.3, assuming the patients to behave independently, what is the probability at any one time that there will not be sufficient staff to attend all emergencies? (Ans. 0.6172)
Q#(11).	There were ten green bottles sitting on the wall. The probability of a green bottle accidentally falling is 0.95. What is the probability that fewer than 8 of the green bottles accidentally fall? (Ans. 0.0115)
Q#(12).	To harvest all the wheat from a field requires 5 sunny days (although not necessarily consecutive days) and farmer Plough now only has one week left to get the job finished. Given that the probability of any day being sunny is 0.8, calculate the probability that he will be able to get the wheat harvested in time. (Ans 0.8520)
Q#(13).	Assuming that 6 in 10 automobile accidents are due mainly to a speed violation, find the probability that among 8 automobile accidents, 6 will be due mainly to a speed violation (Ans. 0.2090)
Q#(14).	In the past 0.1% of all grades have been erroneously reported. Assume that you are taking 5 courses in one semester. What is the probability that all of your grades are correctly reported? (Ans. 0.9950)
Q#(15).	A manufacturer of cotter pins knows that 5 percent of his product is defective. If he sells the cotter pins in boxes of 100, and guarantees that not more than 4 pins will be defective, what is the approximate probability that a box will fail to meet the guaranteed quality?

	(Ans. 0.5595)
Q#(16).	An accident insurance company finds 1/1400 of the population die from a certain kind of accident each year. What is the probability that the company must pay off at least 1 of 350 insured risks against such accidents in a given year. (Ans. 0.2212)
Q#(17).	An intercontinental ballistic missile has 10000 parts. The probability that each part does not fail during a flight is 0.99995, and parts work independently of one another. If any part does not work, the flight is a failure. What is the probability of a successful flight? (Ans. 0.60653)
Q#(18).	Past experience in the production of a certain component has shown that the proportion of defectives is 0.03. Components leave the factory in boxes of 500. What is the probability that? a) a box contain 3 or more defectives (Ans. 0.99994) b) two successive boxes contain 6 or more defectives? (Ans. 0.9942
Q#(19).	The average number of oil tankers arriving each day at a certain port city is known to be 10. The facilities at the port can handle at most 15 tankers per day. What is the probability that on a given day tankers will have to be sent away? (Ans. 0.0487)
Q#(20).	A telephone operator receives on average 2 calls in 3 minutes. Find the probability of receiving more than or equal to 4 calls in 9 minutes (Ans. 0.8488)
Q#(21).	If there are 2 defectives on the average in 10 square meter of cloth, find 5 or more defectives in 25 square meter of cloth (Ans. 0.5595)
Q#(22).	The probability of a successful optical alignment in the assembly of an optical data storage product is 0.8. Assume that the trials are independent. a) What is the probability that the first successful alignment requires exactly four trials? (Ans. 0.0064) b) What is the probability that the first successful alignment requires at most four trials? (Ans. 0.9984)

	<p>(c) What is the probability that the first successful alignment requires at least four trials? (Ans. 0.0080)</p>
Q#(23).	<p>In a clinical study, volunteers are tested for a gene that has been found to increase the risk for a disease. The probability that a person carries the gene is 0.1.</p> <p>(a) What is the probability that four or more people need to be tested to detect two with the gene? (Ans. 0.972)</p> <p>(b) What is the expected number of people to test to detect two with the gene? (Ans. 20)</p>
Q#(24).	<p>Assume that each of your calls to a popular radio station has a probability of 0.02 of connecting, that is, of not obtaining a busy signal. Assume that your calls are independent.</p> <p>(a) What is the probability that your first call that connects is your 10th call? (Ans. 0.0167)</p> <p>(b) What is the probability that it requires more than five calls for you to connect? (Ans. 0.9039)</p> <p>(c) What is the mean number of calls needed to connect? (Ans. 50)</p>
Q#(25).	<p>Assume that the probability that a camera passes the test is 0.8 and the cameras perform independently. Determine the following:</p> <p>(a) Probability that the second failure occurs on the tenth camera tested. (Ans. 0.604)</p> <p>(b) Probability that the second failure occurs in tests of four or fewer cameras. (Ans. 0.1808)</p> <p>(c) Expected number of cameras tested to obtain the third failure. (Ans. 15)</p>
Q#(26).	<p>Printed circuit cards are placed in a functional test after being populated with semiconductor chips. A lot contains 140 cards, and 20 are selected without replacement for functional testing.</p> <p>(a) If 20 cards are defective, what is the probability that at least 1 defective card is in the sample? (Ans. 0.9644)</p> <p>(b) If 5 cards are defective, what is the probability that at least 1 defective card appears in the sample? (Ans. 0.5429)</p>

Q#(27).	<p>A slitter assembly contains 48 blades. Five blades are selected at random and evaluated each day for sharpness. If any dull blade is found, the assembly is replaced with a newly sharpened set of blades.</p> <p>If 10 of the blades in an assembly are dull, what is the probability that the assembly is replaced the first day it is evaluated?</p> <p>(Ans. 0.7069)</p>
Q#(28).	<p>Suppose that lesions are present at 5 sites among 50 in a patient. A biopsy selects 8 sites randomly (without replacement).</p> <p>(a) What is the probability that lesions are present in at least one selected site?</p> <p>(Ans. 0.599)</p> <p>(b) What is the probability that lesions are present in two or more selected sites?</p> <p>(Ans. 0.176)</p>
Q#(29).	<p>In a recent production, 5% of certain electronic components are defective. We need to find 12 non-defective components for our 12 new computers. Components are tested until 12 non-defective ones are found. What is the probability that more than 15 components will have to be tested?</p> <p>(Ans. 0.0055)</p>
Q#(30).	<p>Customers of an internet service provider initiate new accounts at the average rate of 10 accounts per day.</p> <p>(a) What is the probability that more than 8 new accounts will be initiated today?</p> <p>(Ans. 0.6670)</p> <p>(b) What is the probability that more than 16 accounts will be initiated within 2 days?</p> <p>(Ans. 0.7790)</p>
Q#(31).	<p>A quality control engineer tests the quality of produced computers. Suppose that 5% of computers have defects, and defects occur independently of each other.</p> <p>(a) Find the probability of exactly 3 defective computers in a shipment of twenty.</p> <p>(Ans. 0.0599)</p> <p>(b) Find the probability that the engineer has to test at least 5 computers in order to find 2 defective ones.</p> <p>(Ans. 0.9860)</p>

Q#(32).	<p>A computer user tries to recall her password. She knows it can be one of 4 possible passwords. She tries her passwords until she finds the right one. Let X be the number of wrong passwords she uses before she finds the right one. Find $E(X)$ and $Var(X)$</p> <p>(Ans. Mean=3 Variance=12)</p>
Q#(33).	<p>A lab network consisting of 20 computers was attacked by a computer virus. This virus enters each computer with probability 0.4, independently of other computers. Find the probability that it entered at least 10 computers.</p> <p>(Ans. 0.1256)</p>
Q#(34).	<p>Every day, a lecture may be canceled due to inclement weather with probability 0.05. Class cancelations on different days are independent.</p> <p>(a) There are 15 classes left this semester. Compute the probability that at least 4 of them get canceled.</p> <p>(Ans. 0.0060)</p> <p>(b) Compute the probability that the tenth class this semester is the third class that gets canceled.</p> <p>(Ans. 0.00314)</p>
Q#(35).	<p>An internet search engine looks for a certain keyword in a sequence of independent web sites. It is believed that 20% of the sites contain this keyword.</p> <p>Compute the probability that the search engine had to visit at least 5 sites in order to find the first occurrence of a keyword</p> <p>(Ans. 0.4096)</p>
Q#(36).	<p>About ten percent of users do not close Windows properly. Suppose that Windows is installed in a public library that is used by random people in a random order.</p> <p>(a) On average, how many users of this computer do not close Windows properly before someone does close it properly?</p> <p>(Ans. 1.11)</p> <p>(b) What is the probability that exactly 8 of the next 10 users will close Windows properly?</p> <p>(Ans. 0.1937)</p>
Q#(37).	<p>After a computer virus enters the system, a computer manager checks the condition of all important files. She knows that each file has probability 0.2 to be damaged by the virus, independently of other files.</p>

	Compute the probability that the manager has to check at least 6 files in order to find 3 undamaged files. (Ans. 0.0579)														
Q#(38).	Before the computer is assembled, its vital component (motherboard) goes through a special inspection. Only 80% of components pass this inspection. (a) What is the probability that at least 18 of the next 20 components pass inspection? (Ans. 0.0872) (b) On the average, how many components should be inspected until a component that passes inspection is found (Ans. 1.25)														
Q#(39).	A car salesman estimates the following probabilities for the number of cars that he will sell in the next week. <table><tr><td>Number of cars</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Probability</td><td>0.10</td><td>?</td><td>0.35</td><td>0.16</td><td>0.12</td><td>0.07</td></tr></table> (a) Find the probability that only one car will be sold in the week. (b) Find the expected number of cars that will be sold in the week (c) Find the standard deviation of the number of cars that will be sold in the week. (d) Find the probability that no car will be sold in the week. (e) Find the probability that some cars will be sold in the week. (f) Find the probability that at most three cars will be sold in the week. Ans (a) 0.2 (b) 2.21 (c) 1.3513 (d) 0.10 (e) 0.90 (f) 0.81	Number of cars	0	1	2	3	4	5	Probability	0.10	?	0.35	0.16	0.12	0.07
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