| | _ |
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| Junction | 1 |

Not yet answered

Marked out of 2.00

Consider the following distributions for a random variable X. In each case, match the distribution with the expectation of

$$Y = 10 - 2X^2$$

Geometric(p=0.6)

Choose...

Binomial(n=10,p=0.3)

Choose...

Poisson distribution with

$$\lambda = 5$$

Choose...

$$f(x)=rac{1}{2}e^{-x/2}dx, \qquad 0\leq x\leq \infty$$
 Choose...

| Question 2 | |
|--------------|--|
| Answer saved | |
| Marked out o | f 1.00 |
| | |
| | ble is a sequence of n numbers ordered in a particular way. For example, (2,2,3,4) is a 3-tuple. And (3,4,2,2) is a different 3-tuple. The n-tuple is different from the concept of set. |
| | ing about n-tuples, the difference between the sample space of a binomial experiment and the sample space of a geometric experiment is, as n lectures, |
| a. | There is no difference between the outcomes of the sample space in a binomial experiment and a geometric experiment, because they are all Bernoulli trials. |
| ☐ b. | All outcomes in the sample space of the binomial experiment are n-tuples of fixed length n, but in a geometric experiment all outcomes n-tuples differ in length n, some are length n-1, others length different from 1, etc. |
| c. | The random variable in a Binomial experiment has values 0,1,2, and so does the random variable in a Geometric experiment, so since the random variable is the outcome in the sample space both the binomial and the geometric have identical n-tuples. |
| d. | Outcomes in the sample space of the binomial experiment differ in length, but in a geometric experiment all outcomes n-tuples have the same length n. |
| | |

| Question 3 Answer saved |
|---|
| Marked out of 1.00 |
| |
| Two different manufacturers supply a component with an exponentially distributed lifetime, that is, the length of service the component gives until if fails is an exponentially distributed random variable. Manufacturer A's device has expected lifetime 4 months and manufacturer B's has 10 months. A particular user has a batch of devices of which 40% came from manufacturer A and 60% from manufacturer B. If a randomly selected device from this batch is used, what is the probability that the lifetime of this device is more than 2 months? |
| a. 0.4 |
| □ b. 0.6 |
| c. 0.18127 |
| d. 0.73385 |
| |

| Question 4 |
|---|
| Answer saved |
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| |
| A very complicated task, when given by a psychologist to randomly chosen children, takes an average 5 seconds to complete. But there is variability, and we know that there is a standard deviation of 1 second. The probability that a randomly chosen child takes between 4 and 7 seconds to complete the task is |
| Select one: |
| ○ a. 0.6148 |
| O b. 0.00001 |
| ○ c. 0.8185 |
| O d. 0.8185 |
| |

| Question 5 | |
|--------------------|--|
| Answer saved | |
| Marked out of 3.00 | |

This is a question that requires showing work. That means, you must define your notation, must tell us what you are calculating, must show detailed work and provide final answers and explain.

No attachments are allowed for this question. You must answer in the space provided.

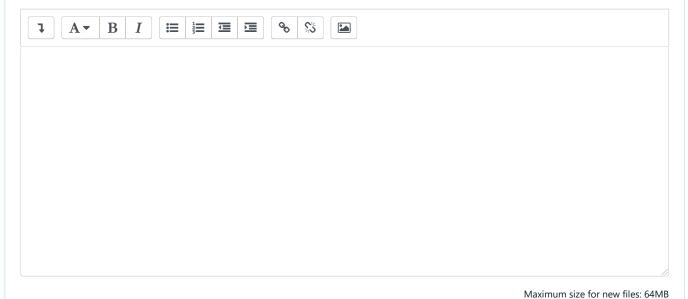
Not all taxpayers want to finance new infrastructure projects. For that reason, public opinion is constantly measured by local governments in order to determine the chance of new projects implementation. Public opinion in a city regarding the opening of a car pool lane in its most congested highway is reflected in the following table.

| | Yes | No |
|--------------------|-------|-------|
| Center of the city | 0.150 | 0.250 |
| Suburbs | 0.250 | 0.150 |
| Rural areas | 0.050 | 0.150 |

The table reflects the opinion of adults eligible to vote and is saying, for example, that 15% of the town adults eligible to vote live in the center of the city and are in favor of the car pool lane.

With this information, answer the following questions:

- (i) What is the probability that a randomly chosen eligible voter disapproves of the car pool lane?
- (ii) What is the probability that a randomly chosen eligible voter does not live in the center of the city and disapproves of the car pool lane?
- (iii) What is the probability that a voter from the suburbs disapproves of the car pool lane?



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Question **6**Answer saved

Marked out of 3.00

Consider a random variable X with density function

$$f(x) = rac{1}{25}(10-2x), \qquad 0 \le x \le 5$$

Match the expressions.

$$\frac{1}{25}(10x-x^2), \qquad 0 \leq x \leq 5$$
 Choose...

0.669873

Choose...

1.66

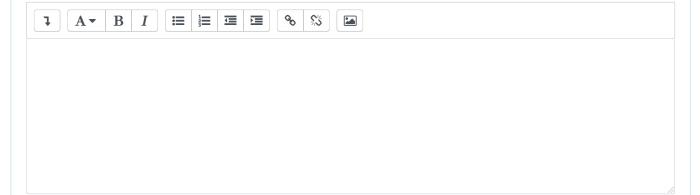
Choose...

| Question 7 | |
|--------------------|--|
| Answer saved | |
| Marked out of 3.00 | |

This is a question that requires showing work. That means, you must define your notation, must tell us what you are calculating, must show detailed work and provide final answers and explain.

A complex system requires that a certain function be performed with reliability 0.9999. Devices that perform the function have reliability only 0.8, and so it is necessary to build redundancy. Several of the devices are to be used, and if at least one works then the function will be performed. Furthermore, we are willing to assume that the redundant devices function independently of each other. How many of the devices must be installed in order that the system will have the desired reliability?

No attachments are allowed for this question. The question must be answered in the space provided.

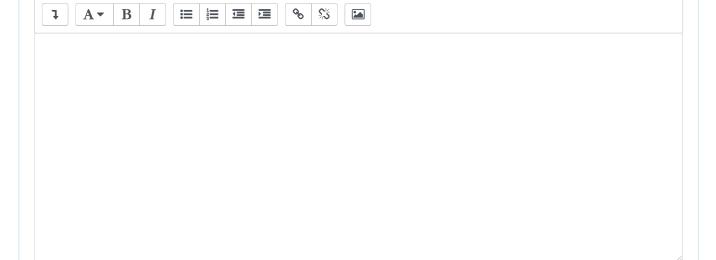


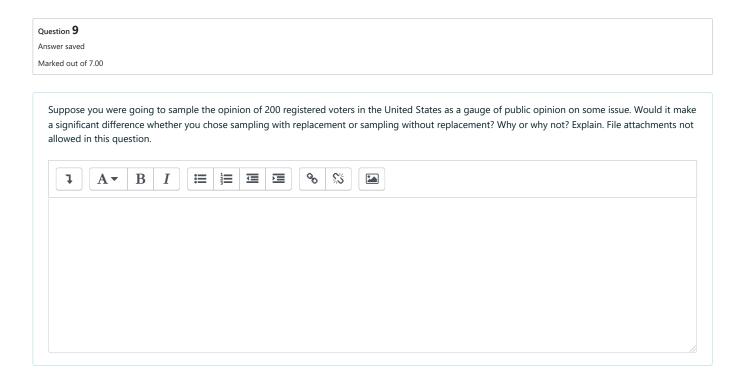
| Question 8 | |
|--------------------|--|
| Answer saved | |
| Marked out of 1.00 | |

(This exercise is based on Horgan 2009, Section 6.3.) A microprocessor chip is a very important component of every computer. Once in a while tech news magazines report a defect in a chip and producers have to respond by giving some indication of the damage that we should expect due to the defect. In 1994, a flaw was discovered in the Intel Pentium chip. The chip would give an incorrect result when dividing two numbers. But Intel initially announced that such an error would occur in 1 in 9 billion divides. Consequently, it did not immediately offer to replace the chip. Horgan (2010) demonstrates what a bad decision that was. She shows, using the product rule for independent events, that the probability of an error can be as large as 0.28 in just 3 billion divides, which is not uncommon in many computer operations.

Calculate the probability of at least one error in 5 billion divides.

Show work. No attachments are allowed. Answer in the space provided.





| Question 10 |
|--|
| Answer saved |
| Marked out of 3.00 |
| |
| |
| Suppose that X is a random variable with Expected value μ_X and variance σ_X^2 . Use rules of expectations to show what the following is equal to |
| \(E |
| $(3X-\mu_{3X})$ |
| V |
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| uestion 11 | | | | | |
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| ot yet answered | | | | | |
| larked out of 1.00 | | | | | |
| | | | | | |
| In the factories and defective | part example of one of | lecture 5, there are several p | orobabilities. When c | alculating | |
| | | $P(B\cap D)$ |) | | |
| we are calculating the | pro | bability that a part randomly | / chosen among the | | parts has the two |
| characteristics of being from | factory | and being | | . On the other hand, when w | we are calculating |
| | | $P(D \mid B)$ |) | | |
| we are calculating the probab | ility that a part random | nly chosen among | par | ts is defective. That last prob | pability is |
| . 1 | Γhe | | | | |
| | | $P(B\cap D)$ |) | | |
| equals | but the | | | | |
| | | $P(D \mid B)$ | 1 | | |
| aguala | If we were just as | lculating the probability that | | nout is defective that probe | hilim in |
| equals | nd that is a | inculating the probability that | a randomly chosen | part is defective, that proba | Dility is |
| | | | | 1 1 1 1 1 1 1 1 1 1 | |
| To make a decision as to whice | th factory a defective pa | \neg | | | , |
| / | | | | ne factory that has the higher | |
| those. This does not mean we method. | know exactly where tr | ne defective part came from, | but we are less likely | to be wrong it we make ou | r prediction using this |
| The example just illustrated h | ere and in the lectures | resembles de example of | | | |
| defective | 100 | P(A D) | P(B D) | joint | |
| total probability | P(C D) | Ryan Voda | Mehul Jain | 0.09 | |
| a conditional probability | Noah Gardner | В | 30 | 0.19 | |
| 0.3 | | | | | |
| | | | | | |

| Question 1 |
|------------|
|------------|

Answer saved

Marked out of 1.00

Let

$$f(x)=3x^2, \qquad 0\leq x\leq 1,$$

and f(x) = 0 for any other value of X in the real line.

The cumulative distribution function of X (cdf) is

Select one:

O a.

$$F(x) = x^3, \quad 0 \le x \le 1$$

O b.

$$F(x)=2x+1, \qquad 0\leq x\leq 1$$

○ c.

$$F(x) = 3, \qquad 0 \le x \le 1$$

 $\bigcirc \ \, \mathsf{d}.$

$$F(x) = 6x, \qquad 0 \le x \le 1$$

| Question 13 Not yet answered Marked out of 4.00 | |
|--|--------|
| According to https://data.census.gov/cedsci/profile?q&g=0100000US , 32.9% of the population 25 yes Bachelor's Degree or Higher Education. We are going to sample from that population at random, with population, we can assume independence. Answer the following questions: | |
| The probability that in a sample of 300 hundred people there are at least 105 with a Bachelor's degree or higher education | Choose |
| The probability that we need to sample less than 15 people to find the first 3 adult with a Bachelor's degree or higher education | Choose |
| In calculating the probability that we need to sample less than 5 people to find the first person with a Bachelor's degree or higher education we are using a | Choose |
| The probability that we need to sample less than 5 people to find the first person with a Bachelor's degree or higher education | Choose |

| 14 aved | | |
|--|-------------------|--|
| d out of 1.00 | | |
| | | |
| according to the LOTUS results seen in lecture, the | expected value of | g(X) = 100+2X equals (select what it equals) for X in the following families |
| K lognormal, with parameters $\mu=10$ and $\sigma=2$ | Choose | |
| (exponential with parameter λ equal 5 | Choose | |
| K Poisson with parameter λ equal 5 | Choose | |

| Question 15 |
|--|
| Answer saved |
| Marked out of 1.00 |
| |
| An analog signal received at a detector (measured in microvolts) is normally distributed with a mean of 100 and a variance of 256. What is the probability that the signal will be less than 120 microvolts given that it is larger than 110 microvolts. |
| Select one: |
| ○ a. 0.60538 |
| ○ b. 2.58 |
| ○ c. 0.7324 |
| Od. 0.2211 |
| |

Question 16

Incomplete answer

Marked out of 3.00

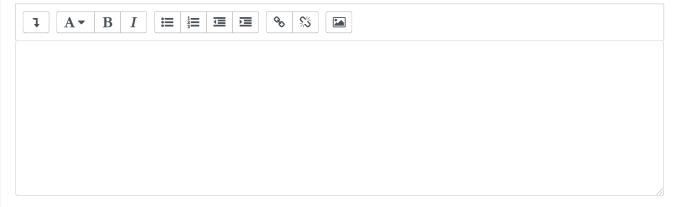
This is a question that requires showing work. That means, you must define your notation, must tell us what you are calculating, must show detailed work and provide final answers and explain.

For submission of your work, you may do the work on paper and upload a pdf file. Alternatively, if you know how to use the equation editor, you may use it and write your answers in the space provided below. If you do that, the work and equations must show clearly.

X is a continuous random variable with density

$$f(x)=\frac{1}{26}(4x+1), \hspace{0.5cm} 2\leq x\leq 4,$$

- (a) Find the 90th percentile of X
- (b) Calculate the expected value of X
- (c) Calculate the probability that \boldsymbol{X} is smaller than 3.2



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| stion 17 |
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| xed out of 1.00 |
| |
| os Angeles County had 10.4 million people in 2019, and possibly much more in 2022. That is a very large population. And yet, some individuals are alled for Jury Duty pretty often, almost every 2 or 3 years. More specifically, they are called to be in a panel from which jurors are chosen. So ometimes do not get selected to be in the jury. But they have to go and be in the panel for a day nonetheless. The article in our course web side titled: The Binomial and Hypergeometric Probability Distributions in Jury Selection" by Jude T. Sommerfeld (a copy of which is available for view for your convenience and only for this exam) talks about panels and jury selection. The article considers that it is appropriate to use the hypergeometric istribution in which of the following scenarios? |
| a. Both of the cases presented in the other two choices given in this question. |
| □ b. Calculating the probability of having 8 black persons in a jury pool of 100 people drawn from a total population of 16000 men. |
| c. Calculating the probability of having 9 women in the choice of 100 potential jurors out of a jury panel of 350 people consisting of 102 women from a district's population which was 53% female. |
| |

| Question 18 Answer saved | | | | | |
|-----------------------------|------------------------------|----------------------------|-------------------------|-----------------------------|---------------------|
| Marked out of 1.00 | | | | | |
| | | | | | |
| | , | · · — | | material studied this week | |
| about different probabilit | ies. In the Pell grant exam | ple, the 0.32 is a | and th | e 0.34 is a | . If we had been |
| interested in calculating t | he probability that a Pell o | grant receiver was from UC | CLA, we could not calcu | late it because we do not h | ave the information |
| about | , which is needed t | o apply | theorem. | | |
| Bayes | P(B) | Prior probability | the addition rule | Conditional Probability | 1 |
| , | - (-7 | | | | |

| Question 19 Not yet answered |
|--|
| Marked out of 1.00 |
| |
| The Maxwell-Boltzman probability density function for the speed of air particles in a room does the following when the room temperature increases. Choose all that applies |
| a. it shifts to the left of the speed horizontal axis |
| ☐ b. Is such that the speed has a higher expected value |
| c. It shifts to the right of the speed horizontal axis |
| d. Is such that the speed has a lower expected value |
| |

| Question 20 | |
|--------------------|--|
| Not yet answered | |
| Marked out of 3.00 | |

This is a question that requires showing work. That means, you must define your notation, must tell us what you are calculating, must show detailed work and provide final answers and explain.

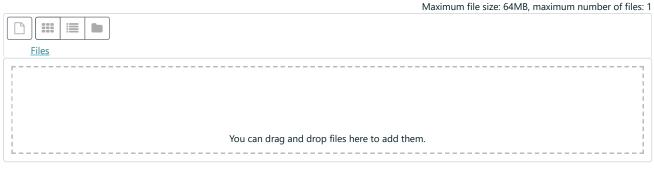
For submission of your work, you may do the work on paper and upload a pdf file. Alternatively, if you know how to use the equation editor, you may use it and write your answers in the space provided below. If you do that, the work and equations must show clearly.

A box contains 6 bags of Crunchy Cheetos and 3 bags of Doritos. At the currently happening DataFest at UCLA, 3 bags are going to be randomly chosen without replacement and given to the student that guesses the answer to the midnight quiz question. We are interested in the number of Cheetos bags in the sample.

- (a) Write a probability distribution table that contains in one column the possible values of the random variable of interest, in another column the probability of those values, and in another the work showing the mathematical calculations that are used to calculate the probabilities in each case. Work must be shown for full credit.
- (b) After you obtain the table, show how to calculate the expected value of the random variable and its standard deviation using the values in your table. Use the appropriate Greek letter symbols to refer to the expected value and the standard deviation. Say in plain words and referring to the context (Cheetos and Doritos) of this problem to describe what the values you obtain are conveying.
- (c) If you had drawn with replacement, what would the expected value have been. Use appropriate formulas for the context of this problem. You do not need to construct a table for this part.

For submission of your work, you may do the work on paper and upload a pdf file. Alternatively, if you know how to use the equation editor, you may use it and write your answers in the space provided below. If you do that, the work and equations must show clearly.





| Question 21 | |
|---|---|
| Not yet answered | |
| Marked out of 1.00 | |
| | |
| The weight of anodized reciprocating pistons produced by Brown Company follows a normal dist 0.2 pounds. | ribution with mean 10 pounds and standard deviation |
| The heaviest 2.5% of the pistons produced are rejected as overweight. | |
| What is the probability that of 10 randomly chosen pistons at least 2 have weight larger than 10. | 392? |
| Select one: | |
| ○ a. 0.0246115 | |
| O b. 0.981 | |
| ○ c. 0.3389 | |
| Od. 0.577 | |
| | |

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Question **22**Not yet answered

Marked out of 3.00

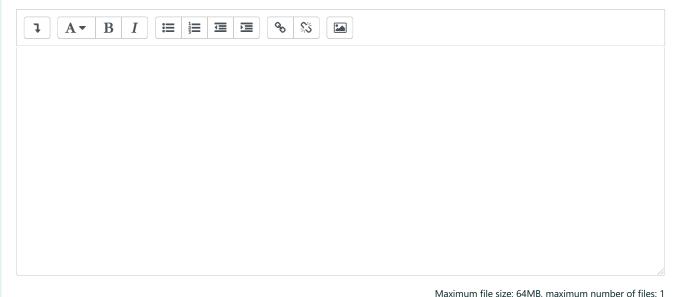
This is a question that requires showing work. That means, you must define your notation, must tell us what you are calculating, must show detailed work and provide final answers and explain.

For submission of your work, you may do the work on paper and upload a pdf file. Alternatively, if you know how to use the equation editor, you may use it and write your answers in the space provided below. If you do that, the work and equations must show clearly.

The National Health and Nutrition Examination Survey (NHANES) examines about 5000 persons per year https://www.cdc.gov/nchs/nhanes/index.htm and constantly screens diabetic people to detect people with type I diabetes. Let X be a random variable measuring the number of diabetic people it takes to find the first Type I diabetic person. Assume that the probability of a diabetic person having type I diabetes is 0.05.

- (i) List five or six outcomes of the sample space. Use as notation: 1 for type 1 and 0 for not type 1 diabetic. Also provide the probability of each of these outcomes and write a small table containing the first values of X and P(X). Indicate also what probability rule are you using to calculate the probabilities of these outcomes and what assumptions you are making to be allowed to apply the rule.
- (ii) Granted that populations are finite. But would a finite number of outcomes in this sample space suffice to guarantee that all the axioms of probability hold? Explain why or why not.
- (iii) Write in a table the cumulative probability mass function for the number of people it takes to find the first diabetic persons. Your table must have values of X in one column and the cumulative probability in the other column, with the column well labelled as cumulative probability. You may write the table for X=1 to X=5 and add another row to complete the table by writing the probability of X greater than 5, because you will not write a table that goes from X=1 to infinity, of course. Can you find a formula for that last probability, P(X>5) in terms of the parameter of the distribution? Hint: there is a handout posted with our lecture notes that will allow you to deduce the formula from one of the formulas given there and your knowledge of probability rules.

For submission of your work, you may do the work on paper and upload a pdf file. Alternatively, if you know how to use the equation editor, you may use it and write your answers in the space provided below. If you do that, the work and equations must show clearly.



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| Question 23 Not yet answered Marked out of 3.00 |
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| Walked Out 01 3.00 |
| This is a question that requires showing work. That means, you must define your notation, must tell us what you are calculating, must show detailed |
| work and provide final answers and explain. |
| No attachments are allowed in this question. You must enter your answer in the space provided. |
| |
| |
| |
| We are now in a scenario where there is a disease floating around and a diagnostic test for the disease. Something like COVID and testing for COVID. In |
| this scenario, 1.7% of the population are True Positive, 10% of the population test positive, and 80% of the population are True Negatives. What is the |
| specificity of this test? Use a table to demonstrate your work. |
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| Question 24 | |
|---|--------------------------|
| Not yet answered | |
| Marked out of 1.00 | |
| | |
| The following expression | |
| $\int_x 2\mu_x^2 x$ | xf(x)dx |
| , where f(x) is a density function and the integration is over all the domain o | f the random variable X, |
| equals | |
| Select one: | |
| ○ a. | $2\mu_x^2$ |
| | |
| ○ b. | σ_x^2 |
| | |
| ○ c. | |
| | $2\mu_x^3$ |
| | |
| O d. 1 | |
| | |

| Question 25 | |
|--------------------|--|
| Not yet answered | |
| Marked out of 3.00 | |

In this question you must show work and explain your work, like in all the work questions. Attachments are not allowed.

We observed several days at the door of the UCLA bookstore how many people entering the store it took to observe a famous person that we recognized entering the textbook store. This is the data we collected.

34, 21, 10, 108, 130, 66, 21, 56, 104, 147

Use this data to estimate the probability that it will take 100 people to observe a famous one that we recognize entering the store.

Describe the steps of your calculations and justify them based on methods used in lecture. No attachments are allowed in this question. Use the space provided below.



| Question 26 | |
|--------------------|--|
| Not yet answered | |
| Marked out of 1.00 | |

A self driving car makes a forbidden U-turn and a regular car crashes against it. Three witnesses, whom we call Bison, Rabindranath, and Tom saw what happened. Suppose the reliability of the witnesses is estimated by having the witnesses observe a number of similar scenes. It is found that Bison has probability 0.9 of stating that the self-driving car did a forbidden U-turn, Rabindranath has probability 0.8 of stating that, and Tom has probability 0.7 of stating that. Let A, B, and C denote, respectively, the events that persons Bison, Rabindranath and Tom will state that the self driving car did the forbidden U-turn. Assuming that these events are independent events, calculate the probability that all three witnesses will testify that the self-driving car did the forbidden U-turn.

- a. 0.504
- Ob. 0.902
- Oc. 0.398
- Od. 0.5

| Question 27 Not yet answered |
|--|
| Marked out of 1.00 |
| |
| According to the lognormal model fitted to radon data from Minnesota, the probability that a randomly chosen household has radon level larger than 4 is estimated as |
| ○ a. 0.574 |
| ○ b. approximately 0 |
| ○ c. 0.426 |
| Od. 0.41006 |

| Question 28 |
|---|
| Not yet answered |
| Marked out of 1.00 |
| |
| The Old Faithful is a famous geyser in Yellowstone (https://www.yellowstonepark.com/things-to-do/geysers-hot-springs/about-old-faithful/) |
| The geyser varies in the time it makes visitors wait for its next eruption. Using past data we calculated that it takes an average of 35 minute waiting time from the moment the last eruption occurred to a new eruption, when the last eruption was short. You arrive at the site where you can watch Old Faithful, but you arrive right at the end of a short eruption. What is the probability that you will have to wait less than 30 minutes for its next eruption? |
| a. 0.57563 |
| $igcap$ b. $1-e^{-35}$ |
| c. 1 |
| □ d. 0.42437 |
| |

| Question 29 | |
|--|----------------------------|
| Not yet answered | |
| Marked out of 1.00 | |
| | |
| If X is uniformly distributed over (0,1), find the density function of | |
| | $Y=e^x$ |
| | |
| · | |
| | |
| | |
| Select one: | |
| ○ a. | $1/y, \qquad y \in [1,e]$ |
| | $1/y, \qquad y \in [1,e]$ |
| | |
| ○ b. exponential with lambda=1. | |
| ○ c. | |
| | $N(\mu=1/2,\sigma^2=1/12)$ |
| | |
| | |

| Question 30 Not yet answered | | | | |
|--|---------|--|---|---|
| Marked out of 3.00 | | | | |
| A box contains 6 bags of Crunchy Cheetos and 3 bags of Doritos. At the cuchosen without replacement and given to the student that guesses the answer Probability that two bags are Crunchy Cheetos bags. The expected number of Doritos bags The probability that one bag is Cruncy Cheetos and the other are Doritos. | , , , , | | , | , |