Feedback — Homework 3

Help Center

You submitted this homework on **Sun 14 Jun 2015 8:03 AM PDT**. You got a score of **90.00** out of **100.00**.

"Sixty percent of the time, it works every time" - Brian Fantana, Anchorman

In this week's material, we cover the basics of probability including trials, outcomes, and events. We also consider some simple applications of Monte Carlo simulation. This week's homework will focus on these topics.

Question 1

Basic probability

What is the sum of the probabilities associated with the all possible outcomes of a single trial?

Enter the number in the box below.

You entered:

1

Your Answer		Score	Explanation
1	✔	10.00	The sum of the probabilities associated with all possible outcomes is 1.
Total		10.00 / 10.00	

Question 2

Which term refers to the set of possible outcomes associated with a trial? Review this week's

math notes on basic probability if necessary.

Your Answer		Score	Explanation
◉ Sample space	✔	10.00	Correct. The sample space is the set of possible outcomes associated with a trial.
○ Event			
○ Experiment			
○ Probability			
Total		10.00 / 10.00	

Question 3

Single trials

You are dealt a single card from a standard deck of 52 playings cards (4 suits with 13 cards in each suit). What is the probability that the card will be of a specific suit? Enter the probability as a decimal number below.

You entered:

0.25

Your Answer		Score	Explanation
0.25	✔	10.00	Correct. There are 13 outcomes corresponding to the event. Each outcome has probability $\frac{1}{52}$ so the probability of the event is $\frac{13}{52}$ which is 0.25.
Total		10.00 / 10.00	

Question 4

Consider a trial with 36 possible outcomes where each outcome has equal probability. How many outcomes correspond to an event that has probability $\frac{1}{9}$? Enter the number of outcomes below.

You entered:

4

Your Answer		Score	Explanation
4	✔	10.00	Correct. Four outcomes, each of probability $\frac{1}{36}$, yields an event with probability $\frac{4}{36} = \frac{1}{9}$.
Total		10.00 / 10.00	

Question 5

Which Python expressions below simulate a single trial corresponding to the roll of a fair six-sided die whose faces are numbered 1 to 6?

Your Answer		Score	Explanation
☑ `random.randrange(1, 7)`	✔	2.50	
☐ `random.randrange(6)`	✔	2.50	
☑ `random.randrange(6) + 1`	✔	2.50	
☐ `random.randrange(1, 6)`	✔	2.50	
Total		10.00 / 10.00	

Question 6

Given a standard deck of 52 cards, what is the probability that two cards drawn at random will have the same rank? Note that first card drawn is **not** added back into the deck when the second card is drawn.

Your Answer		Score	Explanation
$\frac{1}{17}$	✔	10.00	There are 3 cards among the 51 cards remaining in the deck that match the rank of the first card.
$\frac{1}{13}$			
$\frac{4}{51}$			
$\frac{1}{52}$			
Total		10.00 / 10.00	

Question Explanation

Consider the problem with the following setup. The first card is chosen and then we choose the probability that the rank of second card dealt matches the rank of the first card.

Question 7

Expected value

What is the mean GPA of class where 30% of the students have 4.0 GPA, 40% of the students have a 3.0 GPA and 20% of the students have 2.0 GPA, and 10% of the student have a 1.0 GPA?

Review this week's math notes on expected value if necessary.

You entered:

2.9

Your Answer		Score	Explanation
2.9	✔	10.00	Good job.
Total		10.00 / 10.00	

Question 8

Consider a dice game in which you roll two dice. If the sum of the dice is odd, you win $1. If the sum of the dice is even, you lose $1. What is the expected value (in terms of your winnings) of a single roll in this game?

Your Answer		Score	Explanation
◉ The expected value is zero. If I play this game a lot, I expect to break even.	✔	10.00	The expected value is zero since the probability of rolling an even sum equals the probability of rolling an odd sum.
○ The expected value is negative. If I play this game a lot, I expect to lose money.			
○ The expected value is positive. If I play this game a lot, I expect to win money.			
Total		10.00 / 10.00	

Question 9

What is the expected value of `trial(n)` as a function of n? (Here, assume that n is a positive integer.) Enter the answer below as a math expression in n.

```
def trial(n):
    val = random.randrange(n)
    return val
```

As a hint, note that the arithmetic sum $0+1+2+..+k$ has the value $\frac{1}{2}k(k+1)$.

You entered:

```
1/(n)*(1/2*(n1)*(
n))
```

Preview Help

Your Answer		Score	Explanation
1/(n)*(1/2*(n1)*(n))	✖	0.00	Error in student submission: Found disallowed character
Total		0.00 / 10.00	

Question Explanation

Remember that `random.randrange(n)` generates a number between 0 and $n-1$ (including 0 and $n-1$).

Question 10

Monte Carlo simulations

In all of the previous problems, the sample space (space of possible outcomes) had a finite number of outcomes. However, conducting trials where the outcome lies in a continuous space is perfectly reasonable.

Consider that following mystery program. This program uses `random.random()` to generates a random set of points that are uniformly distributed over the square with corners at $(1,1)$, $(-1,1)$, $(1,-1)$, and $(-1,-1)$. (Here, being uniformly distribution means that each point in the square has an equal chance of being generated.) The method then tests whether these points lie inside a unit circle.

As one increases the number of trials, the value returned by `estimate_mystery` tends towards a specific value that has a simple expression involving a well-known constant. Enter this value as a math expression below. (Do not enter a floating point number.) You can consult this guide if you would like to see a list of math constants that Coursera's quiz system recognizes.

You entered:

```
(pi * 1^2)/(2^2)
```

Preview Help

Your Answer		Score	Explanation
(pi * 1^2)/(2^2)	✔	10.00	Correct. The function returns the ratio of the number of points inside the circle divided by the total number of points. This value corresponds to the ratio of the area of the circle to the area of the square which is $\frac{\pi}{4}$.
Total		10.00 / 10.00	