The College Board | AP ADVANCED PLACEMENT PROGRAM

AP® Statistics
2001 Sample Student Responses

3. Every Monday a local radio station gives coupons away to 50 people who correctly answer a question about a news fact from the previous day's newspaper. The coupons given away are numbered from 1 to 50, with the first person receiving coupon 1, the second person receiving coupon 2, and so on, until all 50 coupons are given away. On the following Saturday, the radio station randomly draws numbers from 1 to 50 and awards cash prizes to the holders of the coupons with these numbers. Numbers continue to be drawn without replacement until the total amount awarded first equals or exceeds $300. If selected, coupons 1 through 5 each have a cash value of $200, coupons 6 through 20 each have a cash value of $100, and coupons 21 through 50 each have a cash value of $50.

(a) Explain how you would conduct a simulation using the random number table provided below to estimate the distribution of the number of prize winners each week.

- Using the random digits table provided below I would begin at the left most digit of the column and proceed to select numbers by using every two digits as a number
- If the number falls between 01 - 50 then it will be recorded. If the number exceeds 50 then the entire two digit number will be skipped and I will move on to the next two digit number.
- I will not repeat any two digit number between 01-50 within a given trial
- Because monetary values are assigned to numbers within the groups (01-05), (06-20) & (21-50) I will continue to record the numbers within the row their corresponding values added together meet or exceed $300

(b) Perform your simulation 3 times. (That is, run 3 trials of your simulation.) Start at the leftmost digit in the first row of the table and move across. Make your procedure clear so that someone can follow what you did. You must do this by marking directly on or above the table. <u>Report the number of winners in each of your 3 trials</u>.

TRIAL 1

$50 $50 $200
↓ ↓ ↓
75749 13347 65030 26128 49067 02904 49953 74674 94617 13317   3 winners
$50 $50 $100 $50 $100   Cash winnings = $300
↓   ↓ ↓   ↓ ↓

TRIAL 2

81638 36586 42709 33717 59943 12027 46547 61303 46699 76423   5 winners
$50 $50 $100 $100   Cash winnings = $350
↓ ↓   ↓ ↓

TRIAL 3

38449 46438 91579 01907 72146 05764 22400 94490 49833 09258   4 winners
         ↑   Cash winnings = $300
       can't
       repeat

3. Every Monday a local radio station gives coupons away to 50 people who correctly answer a question about a news fact from the previous day's newspaper. The coupons given away are numbered from 1 to 50, with the first person receiving coupon 1, the second person receiving coupon 2, and so on, until all 50 coupons are given away. On the following Saturday, the radio station randomly draws numbers from 1 to 50 and awards cash prizes to the holders of the coupons with these numbers. Numbers continue to be drawn without replacement until the total amount awarded first equals or exceeds $300. If selected, coupons 1 through 5 each have a cash value of $200, coupons 6 through 20 each have a cash value of $100, and coupons 21 through 50 each have a cash value of $50.

(a) Explain how you would conduct a simulation using the random number table provided below to estimate the distribution of the number of prize winners each week. We could pick 2-digit numbers, from 00 – 99, to represent ~~digits~~ tickets from 1-50, with each ticket assigned two numbers (1 being 00 and 50, 2 being ~~01 and 50~~ 01 and 51, 3 being 03 and 53, and so on until 50 is 49 and 99.) Numbers representing 1-5 would count for $200, and so on; numbers that reoccur (or represent numbers already drawn!!) should be skipped, within each separate trial, as in reality, that ticket would no longer be in the mix. Pick numbers until the prize value equals or exceeds $300.

(b) Perform your simulation 3 times. (That is, run 3 trials of your simulation.) Start at the leftmost digit in the first row of the table and move across. Make your procedure clear so that someone can follow what you did. You must do this by marking directly on or above the table. <u>Report the number of winners in each of your 3 trials.</u>

Trial #1
6 winners
($350)

Trial #2
2 winners
($400)

Trial #3
4 winners
($300)

72749 13347 65030 26128 49067 02904 49953 74674 94617 13317

81638 36566 42709 33717 59943 12027 46547 61303 46699 76423

38449 46438 91579 01907 72146 05764 22400 94490 49833 09258

3. Every Monday a local radio station gives coupons away to 50 people who correctly answer a question about a news fact from the previous day's newspaper. The coupons given away are numbered from 1 to 50, with the first person receiving coupon 1, the second person receiving coupon 2, and so on, until all 50 coupons are given away. On the following Saturday, the radio station randomly draws numbers from 1 to 50 and awards cash prizes to the holders of the coupons with these numbers. Numbers continue to be drawn without replacement until the total amount awarded first equals or exceeds $300. If selected, coupons 1 through 5 each have a cash value of $200, coupons 6 through 20 each have a cash value of $100, and coupons 21 through 50 each have a cash value of $50.

(a) Explain how you would conduct a simulation using the random number table provided below to estimate the distribution of the number of prize winners each week.

Let the numbers 01-05 stand for coupons 1 through 5, 06-20 for coupons 6 through 20, and 21-50 stand for coupons 21 through 50. (Ignore the numbers 00 and 51-99. Using the random number table to select two digit number one at a time until you obtain a number from 01 to 50. This is your first winner. Correspond the winner with the cash value and select winners until the total amount awarded first equals or exceeds $300. Total the number of winners. Repeat the simulation as many times as needed to estimate the distribution of the number of prize winners each week. (The more times you repeat the trial, the closer your distribution will be to the actual distribution.

(b) Perform your simulation 3 times. (That is, run 3 trials of your simulation.) Start at the leftmost digit in the first row of the table and move across. Make your procedure clear so that someone can follow what you did. You must do this by marking directly on or above the table. Report the number of winners in each of your 3 trials.

$50 + 50 + 200 = $300   ↓ ✓ ✓   ③ winners

72749 13347 65030 26128 49067 02904 49953 74674 94617 13317

$50 + $50 + 100 + 50 + 100 = $350   ⑤ winners

81638 36566 42709 33717 59948 12027 46547 61303 46699 76423

$50 + 50 + 50 + 100 + 200 = $450   ⑤ winners

38449 46438 91579 01907 72146 05764 22400 94490 49833 09258