Problem Set 5

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STAT 100, SECTION 0221

PROBLEM #1

```
> #1(a-1) - define variable vector with all possible values, by Kristina Finley
> X_values <- c(0,5,10,15,20)
> X_values
[1]  0  5 10 15 20
> #1(a-2) - calculate the corresponding probabilites by using the algebraic
> # formula, by Kristina Finley
> X_probs <- (5 - (X_values / 5 )) / 15
> X_probs
[1] 0.33333333 0.26666667 0.20000000 0.13333333 0.06666667
> #1(a-3) create a probability distribution table, by Kristina Finley
> X_table <- data.frame(X_values, X_probs)
> names(X_table) <- c("x", "Pr(X=x)")
> print(X_table, row.names = FALSE)
  x    Pr(X=x)
  0 0.33333333
  5 0.26666667
 10 0.20000000
 15 0.13333333
 20 0.06666667
>
```

```
> #1(b-1) check whether (1) all probabilities between 0 and 1, by Kristina Finley
> # Yes, all probabilities are between 0 and 1
> #1(b-2) check whether (2) the sum of all probabilities equals 1,
> # by Kristina Finley
> # The sum of all probabilities equals 1, because 0.33333333 + 0.26666667 +
> # 0.20000000 + 0.13333333 + 0.06666667 = 1
>
```

```
> #1(c) - calculate the mean of X, by Kristina Finley
> X_mean <- sum(X_values * X_probs)
> X_mean
[1] 6.666667
>
```

D. The probability of winning less than $20 is **0.998**.
0.333 + 0.266 + 0.200 + 0.133 + 0.066 = 0.998

PROBLEM #2

```
> #2(a-1) - define a variable vector with all possible values, by Kristina Finley
> Y_values <- c(0,1,2,3,4,5,6)
> Y_values
[1] 0 1 2 3 4 5 6
> #2(a-2) - calculate the corresponding probabilities, by Kristina Finley
> Y_probs <- dbinom(Y_values, size = 6, prob = 0.34)
> Y_probs
[1] 0.082653950 0.255475846 0.329021922 0.225994856 0.087316194 0.017992428 0.001544804
> #2(a-3) - create a probability distribution table, by Kristina Finley
> Y_table <- data.frame(Y_values, Y_probs)
> names(Y_table) <- c("y", "Pr(Y = y)")
> print(Y_table, row.names = FALSE)
 y   Pr(Y = y)
 0 0.082653950
 1 0.255475846
 2 0.329021922
 3 0.225994856
 4 0.087316194
 5 0.017992428
 6 0.001544804
>
> #2(b) - calculate the mean, by Kristina Finley
> Y_mean <- 6 * 0.34
> Y_mean
[1] 2.04
> #2(c) - calculate the standard deviation, by Kristina Finley
> Y_sd <- sqrt(6 * 0.34 * (1 -0.34))
> Y_sd
[1] 1.160345
>
```

D. P(Y = 2) = **0.329**

E. P(Y < 2) = **0.337**
0.882 + 0.255 = 0.337

F. P(2 <= Y <= 4) = **0.641**
0.329 + 0.225 + 0.087 = 0.641