

Midterm (take 2) practice

Name: _____

Note: There will be only one question on the “midterm (take 2)” on Tuesday Nov 7.

Question 1

Consider this R code.

```
# R help for `rnorm` function: "random generation for the normal distribution
# with mean equal to `mean` and standard deviation equal to `sd`.
pop <- rnorm(n = 10000, mean = 2, sd = 1)
sto <- rep(NA, times = 1000)
for(i in 1:500){
  samp <- sample(pop, size = 50)
  sto[i] <- mean(samp)
}
```

(1a) Having run the code above, you find that `mean(sto)` returns NA. This is because of an error in the code. How would you fix the error? (Be specific.)

Answer: `sto` is length 1000, but the for-loop only fills the first 500 spots. I would change the for-loop so that `i` goes from 1 to 1000. You could also keep the code as-is and use `mean(sto, na.rm = T)` to exclude the 500 NAs at the end.

(1b) Once the error is fixed, what would be the result of `mean(sto)` (approximately)?

Answer: It should be close to 2, the mean of `pop`.

(1c) Once the error is fixed, what would be the result of `sd(sto)` (approximately)?

Answer: The sampling variance of the sample mean is $V[X]/n$. In this case $V[X]$ is about 1 (because the standard deviation specified in `rnorm` for generating `pop` is 1), and n (the size of the samples) is 50. So `sd(sto)` should be about $\sqrt{1/50}$.

Question 2

Consider this R code.

```
two_means <- function(x, y){  
  c(mean(x[y == 0]), mean(x[y == 1]))  
}
```

(2a) What would be the result of the following code?

```
two_means(x = c(3,4,2,5,3), y = c(0, 0, 0, 1, 1))
```

Answer: The result will be `c(3, 4)`. The function returns a vector of two means. In this case, it's the mean of the first three components of `x` (the indices for which `y == 0`) and the mean of the last two components of `x` (the indices for which `y == 1`).

(2b) What would be the result of the following code?

```
two_means(x = c(3, 4, 2, 5, 3), y = c(0, 3, 0, 1, 4))
```

Answer: The result will be `c(2.5, 5.0)`. (It would also be acceptable to say `c(2.5, 5)` or `c(5/2, 5)`.)