Stat 123 Homework 8

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Consider confidence intervals from STAT 121. Provide an implementation of the function below to compute a confidence interval assuming the population is normally distributed. By default, sd=NA and confidence.level=0.95, so your function should take a numeric vector 'x' and produce a 95% confidence interval using a t-table value (since the population standard deviation is not specified) with degrees of freedom equal to the length of `x' minus 1.

When the population standard deviation is supplied (i.e., `!is.na(sd)'), your calculation should be based on a standard normal table value. Your function should *not* display results (using, say, 'cat' or 'print') but should instead return a vector of numeric of length 2 containing the upper and lower bound. Kudos to those who provide helpful names in the return vector. Hint: The builtin functions 'qnorm' and 'qt' can provide table values.

```r
ci <- function(x,sd=NA,confidence.level=0.95) {
  x.bar <- mean(x)
  if(!is.na(sd)){
    #run Standard Norm
    std.error <- sd / sqrt(length(x))
    z = qnorm(confidence.level)
    margin.of.error <- z * std.error
    upper.bound <- x.bar + margin.of.error
    lower.bound <- x.bar - margin.of.error
    ci <- c(lower.bound, upper.bound)
    return(ci)
  }
  else{
    #Run sample norm
    #qt
    df <- length(x) - 1
    std.error <- sd(x) / sqrt(length(x))
    t = qt(confidence.level)
    margin.of.error <- t * std.error
    upper.bound <- x.bar + margin.of.error
    lower.bound <- x.bar - margin.of.error
    ci <- c(lower.bound, lower.bound)
    return(ci)

  }
  #In either case return a vector of len 2 with lower and upper bound
}
```

Using the following x vector, run your function and report the resulting confidence interval.

```
x <- c(1,1,1,1,2,2,5,5,5,5,7,7,7,8,8,8,8,8,0)
ci(x, 2, .9)

## [1] 4.096194 5.272227
```