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/*Task 0*/
/*A*/
data normal;
    seed=100;

    do obs=1 to 16;
        x=rand('normal', 9, 2);
        output;
    end;
run;

proc print data=normal;

/*B & C*/
proc means data=normal mean var;
    var x;
    output out=stats;
run;

/*D*/
data stats;
    set stats;
    se = Mean / sqrt(16);
    output;
run;

/*Task 1

x_bar = sample mean
mu_lb = approximate lower bound of confidence interval for pop. mean
S = sample std dev
n = sample size
z = z-score for two-sided 90% CI
Confidence Interval formula = x + z * (std dev)

 N(0,1) ~ (x_bar - mu_lb) / (S / sqrt(n)) by CLT
 0 + z(1) = (x_bar - mu_lb) / (S / sqrt(n))
 z = (x_bar - mu_lb) / (S / sqrt(n))
 z*(S / sqrt(n)) = x_bar - mu_lb
 -x_bar + z*(S / sqrt(n)) = - mu_lb
 mu_lb = x_bar - z*(S / sqrt(n)) where z = 1.645 since z-statistic at .05 alpha (two-sided) = 1.645
 mu_lb = x_bar - 1.645*(S / sqrt(n))



Task 2*/
data ci;
    seed=100;

    do obs=1 to 9;
        x=rand('normal');
        output;
    end;
run;

proc print data=ci;


proc means data=ci mean std clm alpha=0.1;
var x;
output out=ci_data;

/*SAS is using a two sided confidence interval for the mean, with formula ci_upperbound = x_bar + (t * se)
ci_lowerbound = x_bar - (t * se) where x_bar is sample mean, n is sample size,
t = t-statistic for alpha = .05(since it is two-sided) with n-1 degrees of freedom,
and se = sample std dev / sqrt(n) */

/*Task 3*/
data readSp500;
infile '/home/u60821483/my_shared_file_links/haticesahinoglu0/S&P500_textData.txt' firstobs=8 truncover;
input month $ 1-3 day 5-6 year 9-12 /open comma8.2/ high comma8.2 / low comma8.2 / close comma8.2 / adjclose comma8.2 / volum
dailyreturn=(close-open)/open;
if month="Aug" then date=mdy(8,day,year);
else date=mdy(9,day,year);
format date MMDDYY10.;
proc print data=readSp500;
```

```
proc means data=readsp500 mean std clm;
var dailyreturn;
output out=sp500_ci;

/*You cannot conclude that the average daily return is positive since
there are negative numbers within the bounds of the confidence interval
of the mean daily return*/
```