HW11.10

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Problem 1

In a simple random sample of 10 sales clerks at convenience stores in 1989, the mean salary was $25,352.87 and the standard deviation was $3,202.09. Compute a level 95% confidence interval for the population mean. Carefully justify your answer.

```
Conf_lvl <- qt(0.975, 9)

Conf_lvl*(3202.09/sqrt(10))
```

```
[1] 2290.637
```

The t-distribution is used because the population standard deviation is unknown and must be estimated from the sample. This method is appropriate for the small sample size (n=10) as it accounts for the additional uncertainty that comes from using a sample to estimate the population parameters. This requires the assumption that the underlying population of salaries is approximately normally distributed.

Problem 2

Using the R data set mtcars, construct a level 90% confidence interval for the mean horsepower of all cars (a) by direct computation and (b) using the t.test function. Confirm that your answers agree with one another.

a.)

```
mean_hp <- mean(mtcars$hp)
sd_hp <- sd(mtcars$hp)

Conflvl_hp <- qt(0.95, 31)

mu = Conflvl_hp * (sd_hp/sqrt(32))

mean_hp - mu
```

```
[1] 126.1373
```

```
mean_hp + mu
```

```
[1] 167.2377
```

b.)

```
t.test(mtcars$hp, conf.level = .90)
```

```
    One Sample t-test

data:  mtcars$hp
t = 12.103, df = 31, p-value = 2.794e-13
alternative hypothesis: true mean is not equal to 0
90 percent confidence interval:
 126.1373 167.2377
sample estimates:
mean of x
 146.6875
```

c.)

Both results yield the exact same intervals