Equitable Equations: *Confidence intervals with the t-distribution*

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.

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.

Problem 3

In a survey of 18 adults age 45-54, random individuals were asked how many minutes they spend eating breakfast each day. The results are

24	17	26	33	21	38	24	13	41
17	15	19	12	29	19	24	31	15

Construct a level 99% confidence interval for the population mean (a) by direct computation and (b) using the `t.test` function. Confirm that your answers agree with one another.

1) $\mu = \bar{x} \pm t_* \frac{\sigma}{\sqrt{n}}$

$= \$25,352.87 \pm qt(.975, 9) * 3,202.09/sqrt(10)$

$= 25,352.87 \pm 2290.64$

2) a) $\mu = \bar{x} \pm t_* \frac{\sigma}{\sqrt{n}}$

$= mean(mtcars\$hp) \pm qt(.95, 31) * sd(mtcars\$hp)/sqrt(32)$

$= 146.69 \pm 20.55$

$126.14 < \mu < 167.24$

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

126.14 μ < 167.24

3) breakfast_time <- c(24, 17, 26, 33, 21, 38, 24, 13, 41 ...)

a) $\mu = \bar{x} \pm t_* \frac{\sigma}{\sqrt{n}}$

= mean(breakfast_time) ± qt(.995, 17) * sd(breakfast_time)/sqrt(18)

= 23.22 ± 5.78

17.44 < N < 29.00

t.test(breakfast_time, conf.level = .99

17.44 < μ < 29.00