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# Samantha Pendleton (sap21) _ MAM5120 _ Assessed Practical 1 _ Due 8th November 2017

# Question 2
> N <- 38 # sample population
> x <- 10.3 # sample mean
> s <- 4.1^2 # variance

# I
> sigma <- 4.1^2
> sd <- sqrt(sigma)
> zval <- 1.96
> x - zval*(sd/sqrt(N))
[1] 8.996389
> x + zval*(sd/sqrt(N))
[1] 11.60361

# II
> # H0: mu = 10
> # Ha: mu > 10
> z <- (x - 10)/(sd/sqrt(N))
> pnorm(z, lower.tail=FALSE)
[1] 0.3259751

# III
> # H0: mu = 10.7
> # Ha: mu =/ 10.7
> z <- (x - 10.7)/(sd/sqrt(N))
> 2*pnorm(z)
[1] 0.5475694

# IV
> zval <- 2.59
> x - zval*(sd/sqrt(N))
[1] 8.577371
> x + zval*(sd/sqrt(N))
[1] 12.02263

# V
> # H0: mu = 7.7
> # Ha: mu < 7.7
> zval <- 2.59 # 99 %
> x - zval*(se/sqrt(N))
[1] 7.211361
> x + zval*(se/sqrt(N))
[1] 7.628639

# VI
> z <- (x - 7.7)/(se/sqrt(N))
> 2*pnorm(z)
[1] 0.0005092099

# Question 3
> N = 37
> x = 7.42
> S = 0.49^2

# I
> sqrt(S)
[1] 0.49
> se <- sqrt(S)

# II = distribution is t-test

# III
> x - qt(0.975, (N-1))
[1] 5.391906
> x + qt(0.975, (N-1))
[1] 9.448094

# IV
> x - qt(0.995, (N-1))
[1] 4.700515
> x + qt(0.995, (N-1))
[1] 10.13948

# Question 4
> irish <- 120
> scottish <- 130

# I = X~Bin(120,p)

# II
> # H0: p = 0.57
> # Ha: p > 0.57
> p <- 0.57
> z <- 1.64
> pp <- p + z*sqrt(((1/120)*p)*(1-p))
> pp * irish
[1] 77.29418

# III
> pbinom(72, irish, p, lower.tail=FALSE)
[1] 0.2254503

# IV
> o <- 71
> mu <- o/scottish
> s <- sqrt((mu*(1-mu))/scottish)
> zval <- 1.96
> mu - zval*(s/sqrt(scottish))
[1] 0.5386476
> mu + zval*(s/sqrt(scottish))
[1] 0.5536601
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