Final Exam-1

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Question 1

```
p0 = 0.68
n = 53
phat = 50/53 ; phat
```

```
## [1] 0.9433962
```

```
se_ht = sqrt((phat*(1-phat))/n) ; se_ht
```

```
## [1] 0.03174182
```

```
nsim <- 4500
phat_sim <- numeric(nsim)
set.seed(123)
for (i in 1:nsim){
  cur_samp <- sample(c(0, 1), size = n, replace = TRUE
                     , prob = c(1-p0, p0))
  phat_sim[i] <- mean(cur_samp)
}
pval_sim <- (length(which(phat_sim > phat)) + 1) / (nsim + 1)
pval_sim
```

```
## [1] 0.0002221729
```

```
me <- qnorm(0.09, lower.tail = FALSE)*se_ht
me
```

```
## [1] 0.04255801
```

Question 2

sum(all probability) - 1

Question 3

```
q3 <- data.frame(name_brand <- c(28, 49, 39, 46, 44, 37, 33, 42),
                 store_brand <- c(29, 32, 36, 30, 19, 29, 45, 28))
alpha1 <- 0.96
ttest1 <- t.test(q3$name_brand, q3$store_brand,
                 paired = TRUE, conf.level = alpha1)
ttest1
```

```
##
##  Paired t-test
##
## data:  q3$name_brand and q3$store_brand
## t = 2.1008, df = 7, p-value = 0.07379
## alternative hypothesis: true mean difference is not equal to 0
## 96 percent confidence interval:
##  -1.732573 19.232573
## sample estimates:
## mean difference
##            8.75
```

Question 4

Part1

a) = 45 / 69

```
round(45/69,4)
```

```
## [1] 0.6522
```

b) 30 / 34

```
round(30/34,4)
```

```
## [1] 0.8824
```

Part2

(1) : SOlve : 24+ 4 = 28

(2) 30+45=75

(3) 69

```
outcomes <- c(rep("alive", 4), rep("dead", 30), rep("alive", 24), rep("dead", 45))
# outcomes$Total[2]
```

(4) 34

```
# outcomes$Total[1]
```

```
outcomes <- c(rep("alive", 4), rep("dead", 30), rep("alive", 24), rep("dead", 45))
# outcome$Total[2]

set.seed(123)
for(x in 1:10000)
{
outcomes_shuffled <- sample(outcomes)

treatment_group <- outcomes_shuffled[1:69]
control_group <- outcomes_shuffled[70:103]

prop_dead_treatment <- sum(treatment_group == "dead") / length(treatment_group)
prop_dead_control <- sum(control_group == "dead") / length(control_group)

diff_props <- prop_dead_treatment - prop_dead_control
}

p_value <- mean(abs(diff_props) >= 0.23)
```

Question 7

```
library(boot)
set.seed(108)
dat <- c(19.21, 22.01, 19.83, 18.88, 18, 20.5, 22.51, 23.77, 25.91, 20.21, 18.81, 24.14, 17.73, 28.56,
mean_wrapper <- function(x, index){
  mean(x[index])
}
library(boot)
bs1 <- boot(dat, statistic = mean_wrapper, R = 1e4)
se <- sd(bs1$t)
cl <- 0.96
t_quantile <- qt(cl, df = 19)
conf_int <- mean(dat) + c(-1, 1) * t_quantile * se
se
```

```
## [1] 0.708189
```

```
conf_int
```

```
## [1] 19.91068 22.53032
```

Question 8

```r
# p_artifacts_in_12_castles <- 1 - p_no_artifacts
# p_artifacts_outside_12_castles <- 1 - p_artifacts_in_12_castles
# p_artifacts_outside_12_castles
# Define parameters
n <- 9
p <- 0.25
p_no_artifacts <-   pbinom(0, size = n, prob = p, lower.tail = FALSE)
1-p_no_artifacts
```

```
## [1] 0.07508469
```

```r
## [1] 0.005688009
# Probability of Success

pbinom(5-1, n, p, lower.tail = FALSE)
```

```
## [1] 0.04892731
```

Question 11

```r
qnorm(0.05/2, lower.tail = FALSE)
```

```
## [1] 1.959964
```

```r
z <- 1.96
E <- 0.18
s <- 1
n <- (z*(s/E))^2
print(n)
```

```
## [1] 118.5679
```