STAT 1293 - Quiz 2

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Problem 1: Side-by-Side Boxplot (20 points)

1a) Generate 50 observations from the `N(5,5)` distribution. Name the vector `x`. Generate 50 observations from the `N(10,2)` distirbution. Name the vector `y`. Create a data frame that contains both `x` and `y`. Call the data frame `normal.df`.

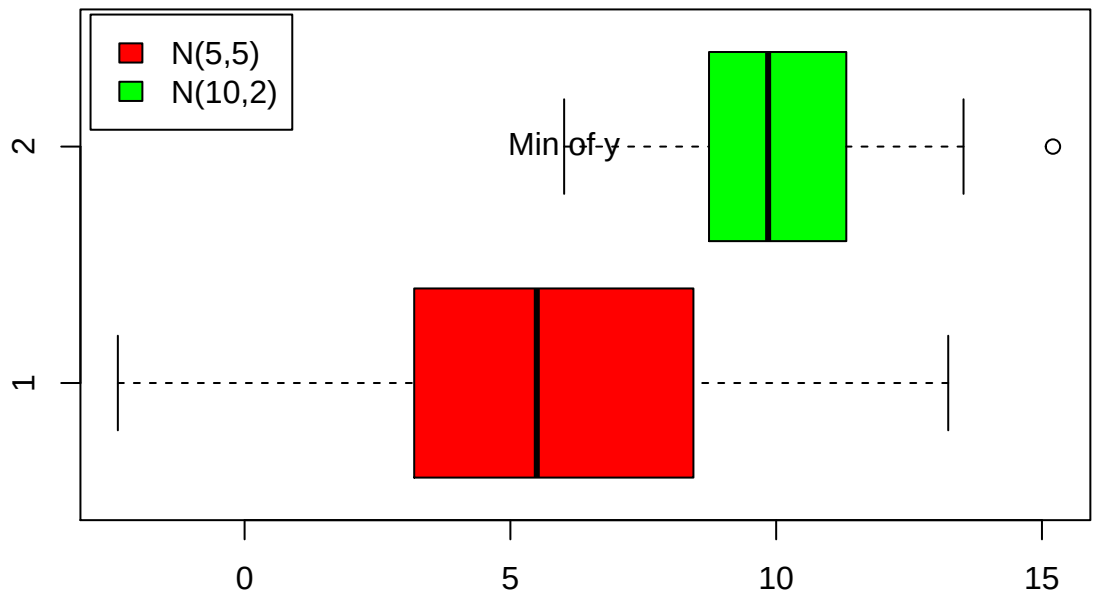
Solution:

```
x <- rnorm(50, 5, 5) #Generate 50 observations from N(5,5)
y <- rnorm(50, 10, 2) #Generate 50 observations from N(10, 2)
normal.df <- data.frame(x,y) #Create data frame with x and y
```

1b) Create a side-by-side boxplot for `x` and `y` using the data frame, `normal.df`.

Solution:

```
boxplot(normal.df$x, normal.df$y, col = c("red", "green"), horizontal = TRUE)
title(main = "Comparison of N(5,5) and N(10,2) distributions", sub = "A Simulation Study")
legend("topleft", inset = 0.01, c("N(5,5)", "N(10,2)"), fill = c("red", "green"))
text(min(normal.df$y), 2, "Min of y")
```



Problem 2: Histogram (10 points)

2a) Generate 100 observations from the `N(0,1)`, $t_{3,0}$ and the χ^2_{30} distributions, respectively. Call them `Z`, `T`, and `X`. (3 points)

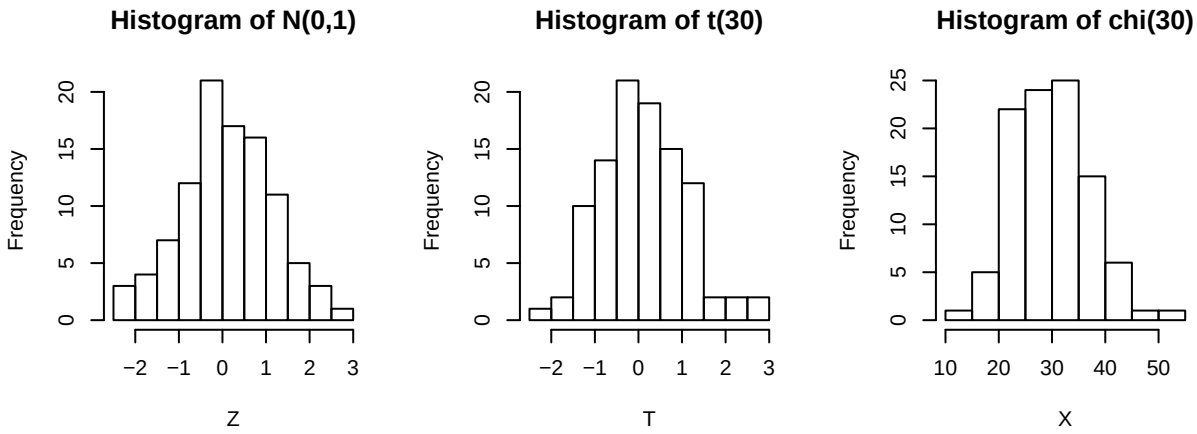
Solution:

```
Z <- rnorm(100, 0, 1)
T <- rt(100, 30)
X <- rchisq(100, 30)
```

2b) Create a histogram for each sample and put them in one plot with multiple panels.

Solution:

```
par(mfrow = c(1, 3), pty = "s")
hist(Z, main = "Histogram of N(0,1)")
hist(T, main = "Histogram of t(30)")
hist(X, main = "Histogram of chi(30)")
```



Problem 3: Pie chart (10 points)

3a) Sample 100 observations repeatedly from a small set: `{"S", "M", "L"}` with probabilities `(0.3, 0.5, 0.2)` respectively. Call the sample `V`. Note that you have to sample with replacement.

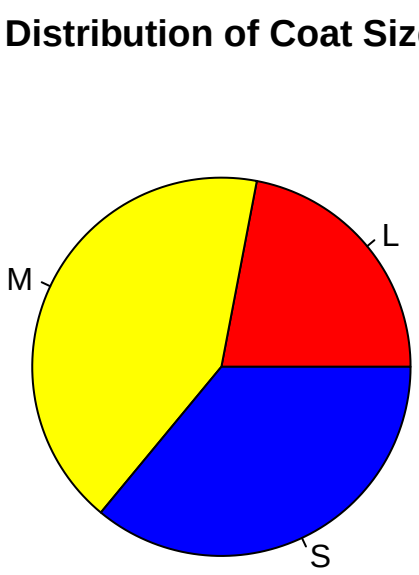
Solution:

```
V <- sample(c("S", "M", "L"), 100, replace = TRUE, prob = c(0.3, 0.5, 0.2))
V.tl <- table(V)
```

3b) Create a pie graph for `V`,

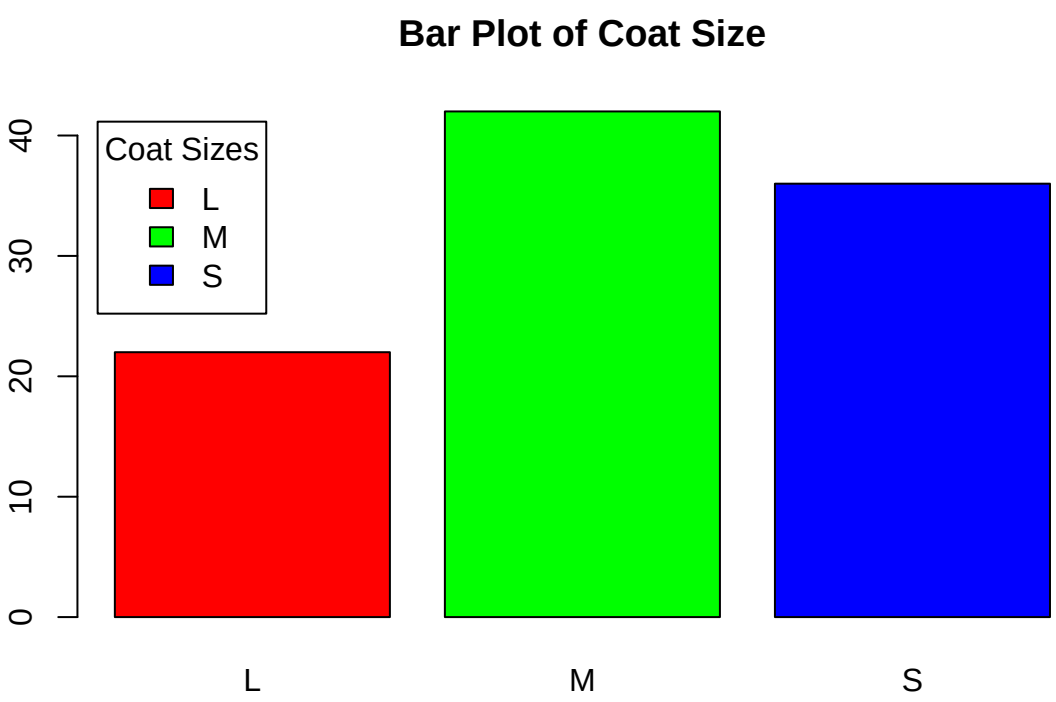
Solution:

```
pie(V.tl, col = c("red", "yellow", "blue"), main = "Distribution of Coat Size")
```



Problem 4: Bargraph: Create a bar graph for `V` (10 points)

```
barplot(V.tl, col = rainbow(3))
legend("topleft", inset = 0.02, title = "Coat Sizes", c("L", "M", "S"), fill = rainbow(3))
title(main = "Bar Plot of Coat Size")
```


Bar Plot of Coat Size
Coat Sizes
L
M
S
0
10
20
30
40
L
M
S