

# Assignment 1 Question 1

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## Part b)

```
data <- read.csv("EconomicMobility.csv")
```

```
powerfun <- function(x, alpha) {  
  if(sum(x <= 0) > 1) stop("x must be positive")  
  if (alpha == 0)  
    log(x)  
  else if (alpha > 0) {  
    x^alpha  
  } else -x^alpha  
}
```

```
power_transformation <- function(x, y) {  
  function(alpha_x, alpha_y) {  
    power_x <- powerfun(x + 1, alpha_x)  
    power_y <- powerfun(y + 1, alpha_y)  
    new_data <- list("x" = power_x, "y" = power_y)  
  }  
}
```

```
power_transformed = power_transformation(data$Population, data$Commute)  
data_transformed <- power_transformed(-0.5, -0.5)
```

```
library("ggplot2")  
library("gridExtra")  
plot1 <- ggplot(data) +  
  geom_point(  
    aes(x = Population,  
        y = Commute,  
        alpha = 0.5)  
  ) +  
  labs(  
    title = "Population vs. Commute",  
    x = "Population",  
    y = "Commute"  
  )
```

```
plot2 <- ggplot(data) +  
  geom_point(  
    aes(x = data_transformed$x,
```

```

    y = data_transformed$y,
    alpha = 0.5)
) +
labs(
  title = "Power-Transformed Population vs. Commute",
  x = "Power-Transformed Population  $\sim \alpha[x] == -0.5$ ",
  y = "Power-Transformed Commute  $\sim \alpha[y] == -0.5$ "
)

grid.arrange(plot1, plot2, nrow = 1)

```

