4. Geospatial Data

City	Latitude	Longitude	Population
New York	40.7128	-74.0060	8398748
Los Angeles	34.0522	-118.2437	3990456
Chicago	41.8781	-87.6298	2705994
Houston	29.7604	-95.3698	2325502
Phoenix	33.4484	-112.0740	1660272

☐ Create a scatter plot of cities on a map based on Latitude and Longitude.
☐ Generate a bubble map where bubble size represents Population.
☐ Plot a choropleth map of Population by city.
☐ Create a bar plot showing the top 5 cities by Population.
☐ Generate a heatmap showing the density of cities based on Population.

R Program :-

```
# Data

city <- c("New York", "Los Angeles", "Chicago", "Houston", "Phoenix")

latitude <- c(40.7128, 34.0522, 41.8781, 29.7604, 33.4484)

longitude <- c(-74.0060, -118.2437, -87.6298, -95.3698, -112.0740)

population <- c(8398748, 3990456, 2705994, 2325502, 1660272)


# Create a scatter plot of cities on a map based on Latitude and Longitude

plot(longitude, latitude, main="Cities Map", xlab="Longitude", ylab="Latitude", pch=20)

text(longitude, latitude, labels=city, pos=4, cex=0.7)


# Generate a bubble map where bubble size represents Population

plot(longitude, latitude, main="Population Bubble Map", xlab="Longitude", ylab="Latitude",
    cex=sqrt(population)/500, pch=21, bg="lightblue")

text(longitude, latitude, labels=city, pos=4, cex=0.7)


# Plot a choropleth map of Population by city
# Note: Without a map library, we'll use a simplified representation

barplot(population, names.arg=city, main="Population by City", xlab="City",
ylab="Population")
```

```r
# Create a bar plot showing the top 5 cities by Population

barplot(sort(population, decreasing=TRUE), names.arg=city[order(population,
decreasing=TRUE)],

        main="Top 5 Cities by Population", xlab="City", ylab="Population", las=2)


# Generate a heatmap showing the density of cities based on Population

# Note: This is a simplified heatmap representation

image(as.matrix(population), main="Population Density Heatmap", xaxt="n", yaxt="n")

axis(1, at=seq(0, 1, length.out=5), labels=city)
```

```r
# Data
city <- c("New York", "Los Angeles", "Chicago", "Houston", "Phoenix")
latitude <- c(40.7128, 34.0522, 41.8781, 29.7604, 33.4484)
longitude <- c(-74.0060, -118.2437, -87.6298, -95.3698, -112.0740)
population <- c(8398748, 3990456, 2705994, 2325502, 1660272)

# Create a scatter plot of cities on a map based on Latitude and Longitude
plot(longitude, latitude, main="Cities Map", xlab="Longitude", ylab="Latitude", pch=20)
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Generate a bubble map where bubble size represents Population
plot(longitude, latitude, main="Population Bubble Map", xlab="Longitude", ylab="Latitude",
     cex=sqrt(population)/500, pch=21, bg="lightblue")
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Plot a choropleth map of Population by city
# Note: Without a map library, we'll use a simplified representation
barplot(population, names.arg=city, main="Population by City", xlab="City", ylab="Population")

# Create a bar plot showing the top 5 cities by Population
barplot(sort(population, decreasing=TRUE), names.arg=city[order(population, decreasing=TRUE)],
        main="Top 5 Cities by Population", xlab="City", ylab="Population", las=2)

# Generate a heatmap showing the density of cities based on Population
# Note: This is a simplified heatmap representation
image(as.matrix(population), main="Population Density Heatmap", xaxt="n", yaxt="n")
axis(1, at=seq(0, 1, length.out=5), labels=city)
```

Screenshot 1 (top window)

```r
# Data
city <- c("New York", "Los Angeles", "Chicago", "Houston", "Phoenix")
latitude <- c(40.7128, 34.0522, 41.8781, 29.7604, 33.4484)
longitude <- c(-74.0060, -118.2437, -87.6298, -95.3698, -112.0740)
population <- c(8398748, 3990456, 2705994, 2325502, 1660272)

# Create a scatter plot of cities on a map based on Latitude and Longitude
plot(longitude, latitude, main="Cities Map", xlab="Longitude", ylab="Latitude", pch=20)
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Generate a bubble map where bubble size represents Population
plot(longitude, latitude, main="Population Bubble Map", xlab="Longitude", ylab="Latitude",
     cex=sqrt(population)/500, pch=21, bg="lightblue")
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Plot a choropleth map of Population by city
# Note: Without a map library, we'll use a simplified representation
barplot(population, names.arg=city, main="Population by City", xlab="City", ylab="Population")

# Create a bar plot showing the top 5 cities by Population
barplot(sort(population, decreasing=TRUE), names.arg=city[order(population, decreasing=TRUE)],
        main="Top 5 Cities by Population", xlab="City", ylab="Population", las=2)

# Generate a heatmap showing the density of cities based on Population
# Note: This is a simplified heatmap representation
image(as.matrix(population), main="Population Density Heatmap", xaxt="n", yaxt="n")
axis(1, at=seq(0, 1, length.out=5), labels=city)
```

Console:
```
R 4.3.2 · C:/Karthik/Data Handling/
> # Create a bar plot showing the top 5 cities by Population
> barplot(sort(population, decreasing=TRUE), names.arg=city[order(population, decreasing= .... [TRUNCATED]
> # Generate a heatmap showing the density of cities based on Population
> # Note: This is a simplified heatmap representation
> image(as.matrix(popul .... [TRUNCATED]
> axis(1, at=seq(0, 1, length.out=5), labels=city)
>
```

Plot: **Population by City**

Screenshot 2 (bottom window)

```r
# Data
city <- c("New York", "Los Angeles", "Chicago", "Houston", "Phoenix")
latitude <- c(40.7128, 34.0522, 41.8781, 29.7604, 33.4484)
longitude <- c(-74.0060, -118.2437, -87.6298, -95.3698, -112.0740)
population <- c(8398748, 3990456, 2705994, 2325502, 1660272)

# Create a scatter plot of cities on a map based on Latitude and Longitude
plot(longitude, latitude, main="Cities Map", xlab="Longitude", ylab="Latitude", pch=20)
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Generate a bubble map where bubble size represents Population
plot(longitude, latitude, main="Population Bubble Map", xlab="Longitude", ylab="Latitude",
     cex=sqrt(population)/500, pch=21, bg="lightblue")
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Plot a choropleth map of Population by city
# Note: Without a map library, we'll use a simplified representation
barplot(population, names.arg=city, main="Population by City", xlab="City", ylab="Population")

# Create a bar plot showing the top 5 cities by Population
barplot(sort(population, decreasing=TRUE), names.arg=city[order(population, decreasing=TRUE)],
        main="Top 5 Cities by Population", xlab="City", ylab="Population", las=2)

# Generate a heatmap showing the density of cities based on Population
# Note: This is a simplified heatmap representation
image(as.matrix(population), main="Population Density Heatmap", xaxt="n", yaxt="n")
axis(1, at=seq(0, 1, length.out=5), labels=city)
```

Console:
```
R 4.3.2 · C:/Karthik/Data Handling/
> # Create a bar plot showing the top 5 cities by Population
> barplot(sort(population, decreasing=TRUE), names.arg=city[order(population, decreasing= .... [TRUNCATED]
> # Generate a heatmap showing the density of cities based on Population
> # Note: This is a simplified heatmap representation
> image(as.matrix(popul .... [TRUNCATED]
> axis(1, at=seq(0, 1, length.out=5), labels=city)
>
```

Plot: **Top 5 Cities by Population**

```r
# Data
city <- c("New York", "Los Angeles", "Chicago", "Houston", "Phoenix")
latitude <- c(40.7128, 34.0522, 41.8781, 29.7604, 33.4484)
longitude <- c(-74.0060, -118.2437, -87.6298, -95.3698, -112.0740)
population <- c(8398748, 3990456, 2705994, 2325502, 1660272)

# Create a scatter plot of cities on a map based on Latitude and Longitude
plot(longitude, latitude, main="Cities Map", xlab="Longitude", ylab="Latitude", pch=20)
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Generate a bubble map where bubble size represents Population
plot(longitude, latitude, main="Population Bubble Map", xlab="Longitude", ylab="Latitude",
     cex=sqrt(population)/500, pch=21, bg="lightblue")
text(longitude, latitude, labels=city, pos=4, cex=0.7)

# Plot a choropleth map of Population by city
# Note: Without a map library, we'll use a simplified representation
barplot(population, names.arg=city, main="Population by City", xlab="City", ylab="Population")

# Create a bar plot showing the top 5 cities by Population
barplot(sort(population, decreasing=TRUE), names.arg=city[order(population, decreasing=TRUE)],
        main="Top 5 Cities by Population", xlab="City", ylab="Population", las=2)

# Generate a heatmap showing the density of cities based on Population
# Note: This is a simplified heatmap representation
image(as.matrix(population), main="Population Density Heatmap", xaxt="n", yaxt="n")
axis(1, at=seq(0, 1, length.out=5), labels=city)
```

27:49   (Top Level)   R Script

Console   Terminal   Background Jobs

R 4.3.2 · C:/Karthik/Data Handling/

> # Create a bar plot showing the top 5 cities by Population
> barplot(sort(population, decreasing=TRUE), names.arg=city[order(population, decreasing= .... [TRUNCATED]

> # Generate a heatmap showing the density of cities based on Population
> # Note: This is a simplified heatmap representation
> image(as.matrix(popul .... [TRUNCATED]

> axis(1, at=seq(0, 1, length.out=5), labels=city)
>

Environment   History   Connections   Tutorial

Import Dataset   138 MiB   List

R   Global Environment

Values
city   chr [1:5] "New York" "Los Angeles" "Chi…
latitude   num [1:5] 40.7 34.1 41.9 29.8 33.4
longitude   num [1:5] -74 -118.2 -87.6 -95.4 -112.1
population   num [1:5] 8398748 3990456 2705994 23255…

Files   Plots   Packages   Help   Viewer   Presentation

Zoom   Export

Population Density Heatmap

New York   Chicago Houston Phoenix