Simulation results visualization notebook

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Offcourse these are non-exhaustive visualizations.

```
library(data.table)
```

```
## Warning: package 'data.table' was built under R version 4.4.2
```

```
library(ggplot2)
library(ggpubr)
```

```
## Warning: package 'ggpubr' was built under R version 4.4.2
```

Simulation 1

```
sim1 <- fread("C:/Users/Qba Liu/Documents/STUDIA/BIOINF_MASTER_BERLIN/MASTER_THESIS/SIMULATION_POLIGON/S
```

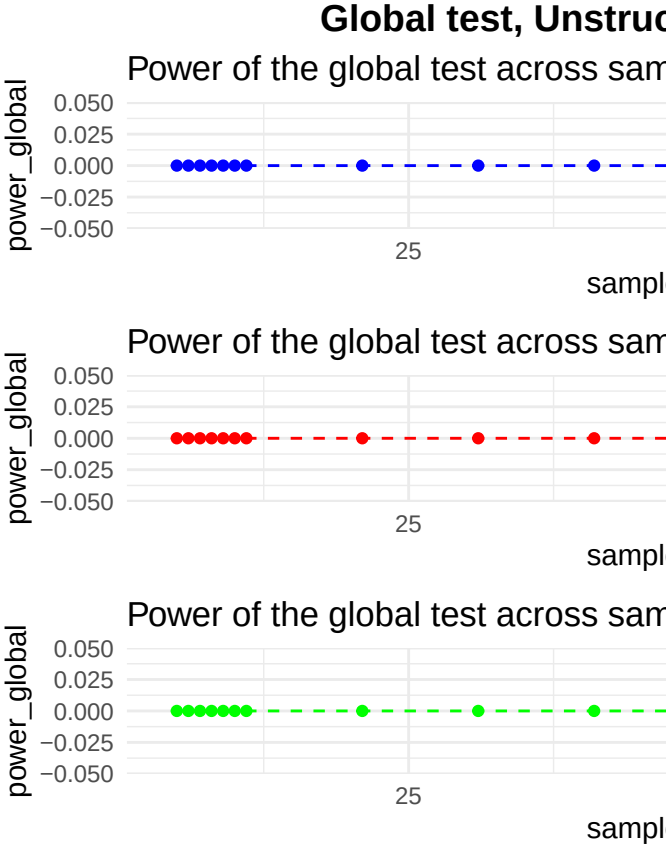
Stratify by the covariance structure

```
sim1_Unst <- sim1[sim1$covariance_structures == 'Unstructured']
sim1_AR1 <- sim1[sim1$covariance_structures == 'AR(1)']
sim1_AR2 <- sim1[sim1$covariance_structures == 'AR(2)']
sim1_Toe <- sim1[sim1$covariance_structures == 'Toeplitz']
```

Unstructured covariance matrix

```
plot1 <- ggplot(sim1_Unst[sim1_Unst$effect_sizes == 1,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 1") +
  theme_minimal()

plot2 <- ggplot(sim1_Unst[sim1_Unst$effect_sizes == 2,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "red") +
```

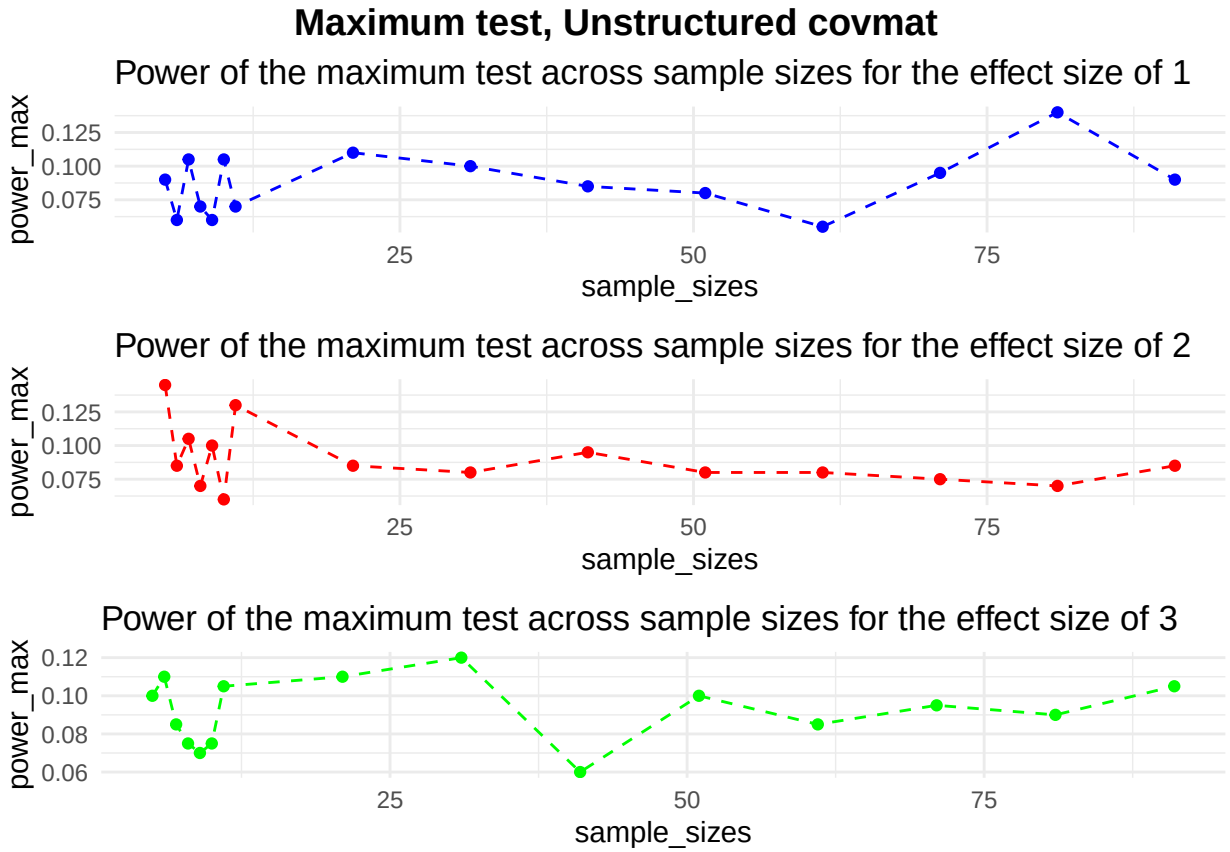
```
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_Unst[sim1_Unst$effect_sizes == 3,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Global test, Unstructured covmat",
                                color = "black", face = "bold", size = 14))
```



Plot the power across the sample sizes for each effect size

```
plot1 <- ggplot(sim1_Unst[sim1_Unst$effect_sizes == 1,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 1") +
  theme_minimal()

plot2 <- ggplot(sim1_Unst[sim1_Unst$effect_sizes == 2,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "red") +
```

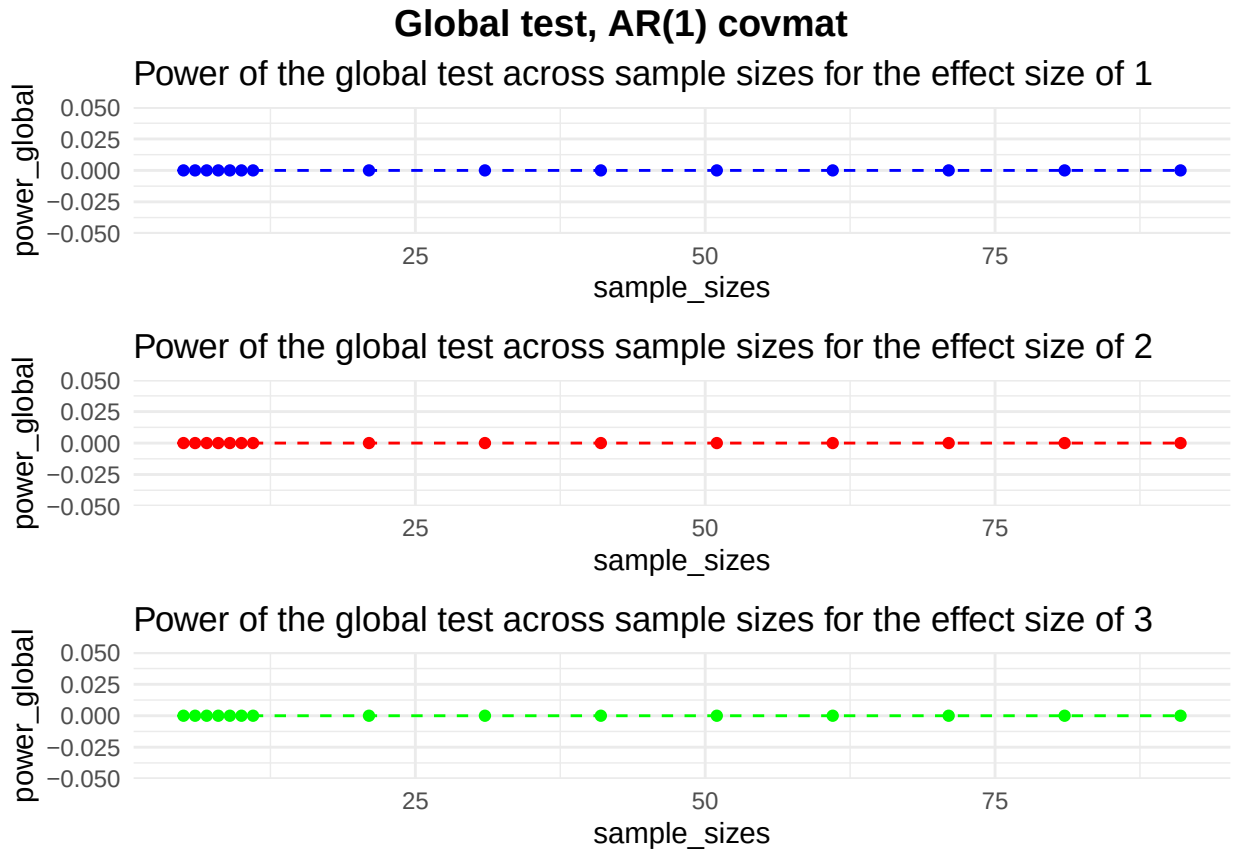
```
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_Unst[sim1_Unst$effect_sizes == 3,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Maximum test, Unstructured covmat",
                                color = "black", face = "bold", size = 14))
```



AR(1) covariance matrix #### Plot the power across the sample sizes for each effect size

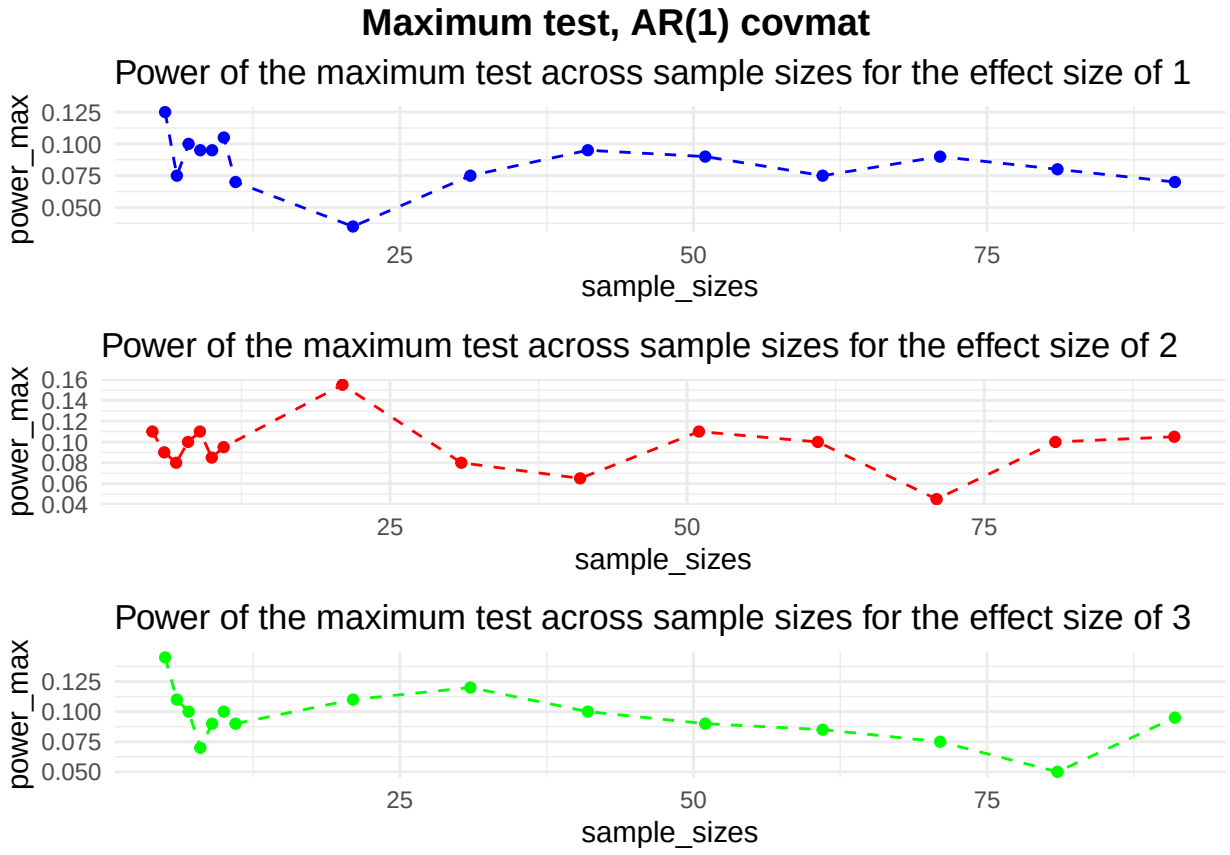
```
plot1 <- ggplot(sim1_AR1[sim1_AR1$effect_sizes == 1,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 1") +
  theme_minimal()

plot2 <- ggplot(sim1_AR1[sim1_AR1$effect_sizes == 2,], aes(x = sample_sizes, y = power_global)) +
```

```
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_AR1[sim1_AR1$effect_sizes == 3,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Global test, AR(1) covmat",
                                color = "black", face = "bold", size = 14))
```




```
plot1 <- ggplot(sim1_AR1[sim1_AR1$effect_sizes == 1,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 1") +
  theme_minimal()

plot2 <- ggplot(sim1_AR1[sim1_AR1$effect_sizes == 2,], aes(x = sample_sizes, y = power_max)) +
```

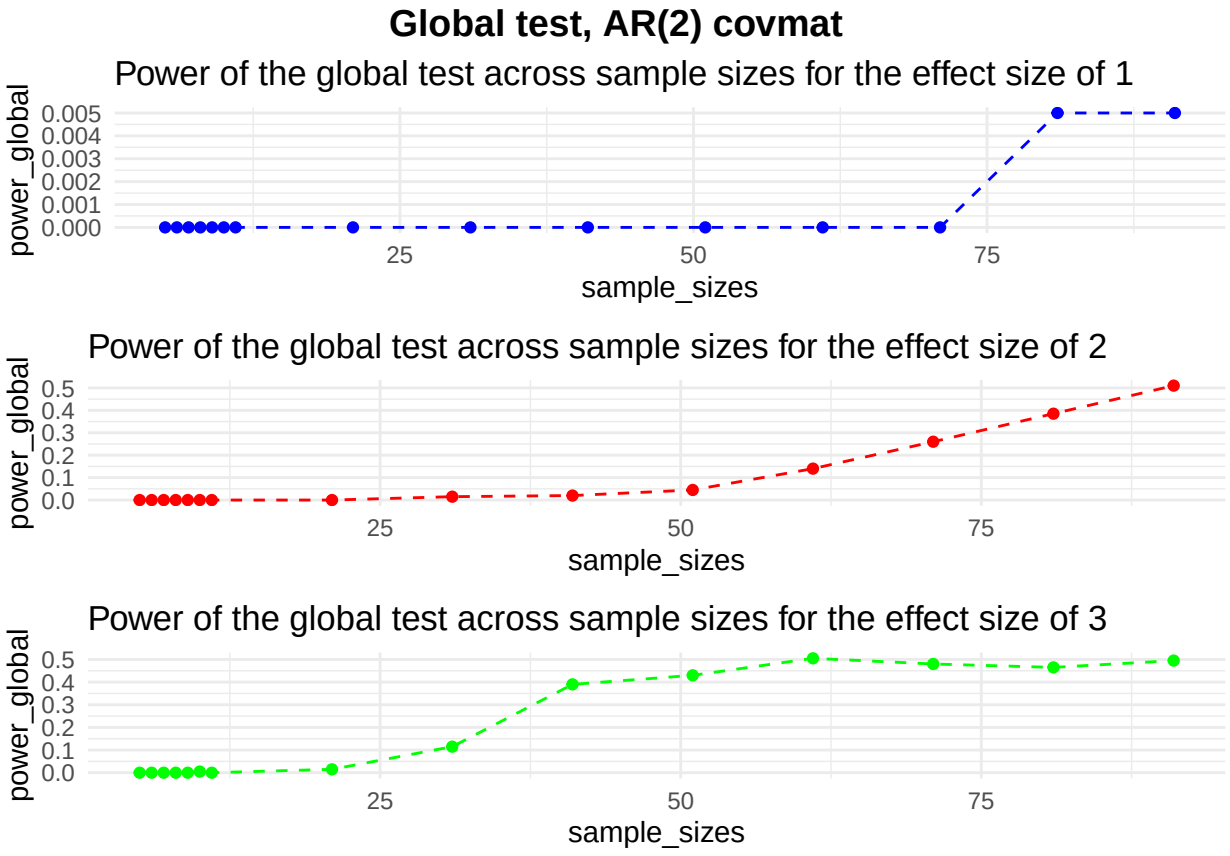
```
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_AR1[sim1_AR1$effect_sizes == 3,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Maximum test, AR(1) covmat",
                                color = "black", face = "bold", size = 14))
```



AR(2) covariance matrix #### Plot the power across the sample sizes for each effect size

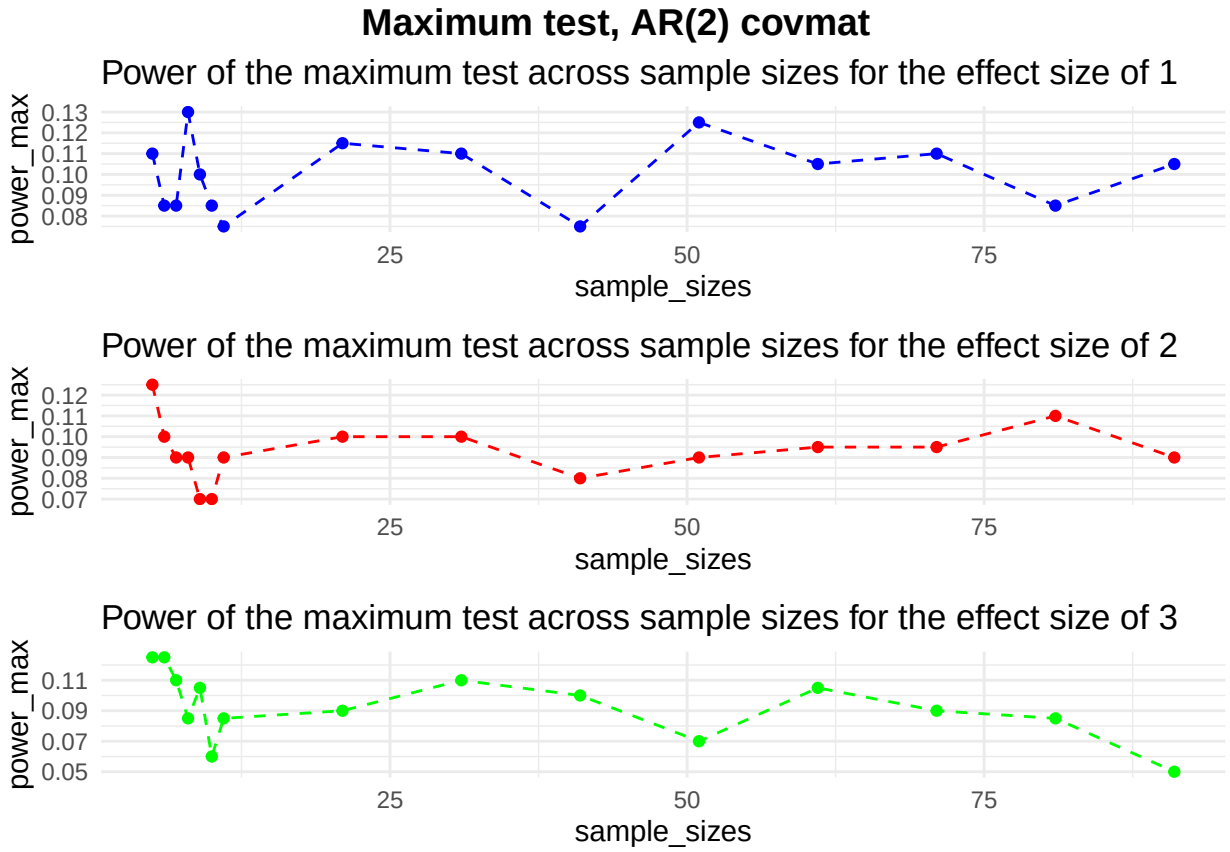
```
plot1 <- ggplot(sim1_AR2[sim1_AR2$effect_sizes == 1,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 1") +
  theme_minimal()
```

```r
plot2 <- ggplot(sim1_AR2[sim1_AR2$effect_sizes == 2,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_AR2[sim1_AR2$effect_sizes == 3,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Global test, AR(2) covmat",
                                color = "black", face = "bold", size = 14))
```




```r
plot1 <- ggplot(sim1_AR2[sim1_AR2$effect_sizes == 1,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 1") +
  theme_minimal()
```

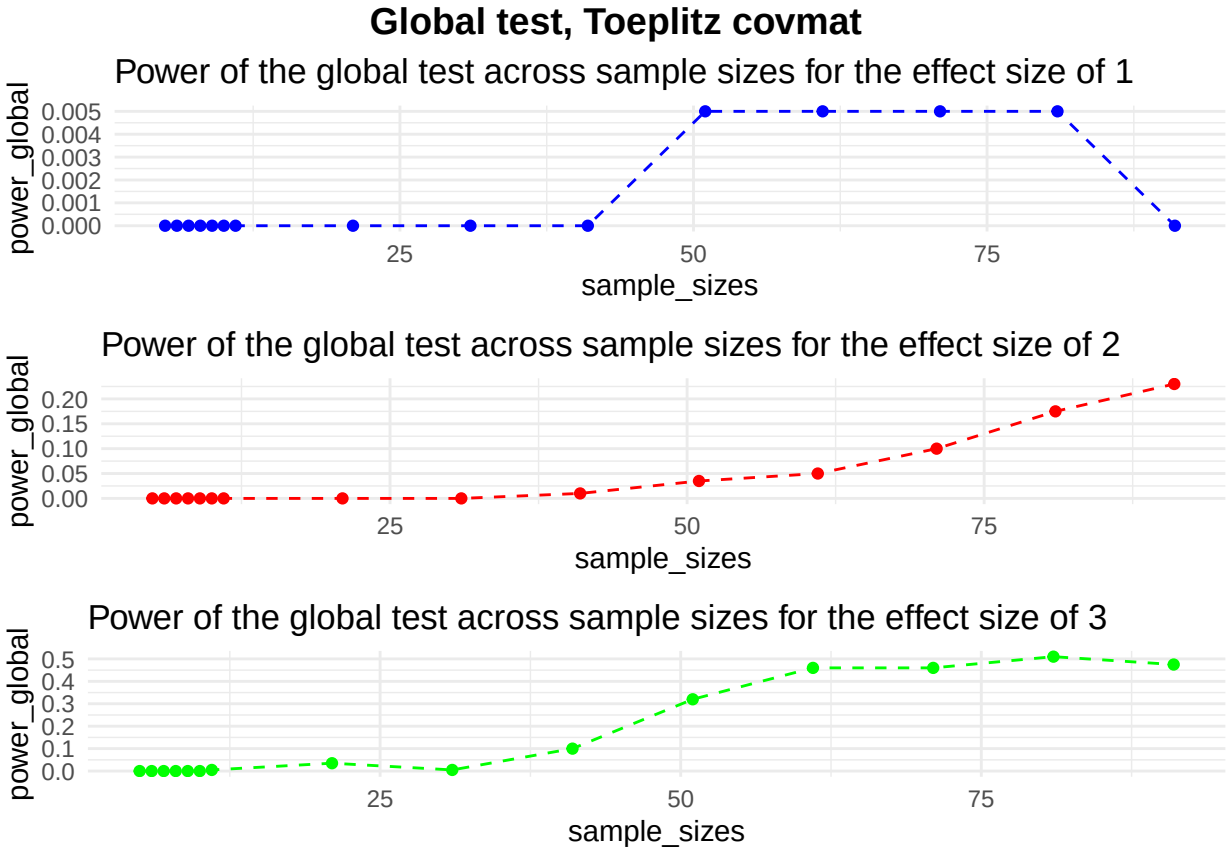
```
plot2 <- ggplot(sim1_AR2[sim1_AR2$effect_sizes == 2,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_AR2[sim1_AR2$effect_sizes == 3,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Maximum test, AR(2) covmat",
                                color = "black", face = "bold", size = 14))
```



Toeplitz covariance matrix #### Plot the power across the sample sizes for each effect size

```
plot1 <- ggplot(sim1_Toe[sim1_Toe$effect_sizes == 1,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 1") +
  theme_minimal()
```

```
plot2 <- ggplot(sim1_Toe[sim1_Toe$effect_sizes == 2,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_Toe[sim1_Toe$effect_sizes == 3,], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Global test, Toeplitz covmat",
                                color = "black", face = "bold", size = 14))
```




```
plot1 <- ggplot(sim1_Toe[sim1_Toe$effect_sizes == 1,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 1") +
  theme_minimal()
```

```r
plot2 <- ggplot(sim1_Toe[sim1_Toe$effect_sizes == 2,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 2") +
  theme_minimal()

plot3 <- ggplot(sim1_Toe[sim1_Toe$effect_sizes == 3,], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the effect size of 3") +
  theme_minimal()



combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Maximum test, Toeplitz covmat",
                                color = "black", face = "bold", size = 14))
```