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# libraries
library(ggplot2)
library(dplyr)
library(tidyr) # For pivot_longer function
library(gridExtra)
library(ggthemes) # For additional themes
library(RColorBrewer) # For color palettes

# color palette
palette_cut <- brewer.pal(n = 5, name = "Dark2") # 5 colors for 'cut'

# Histogram
hist_plot <- ggplot(diamonds, aes(x = price)) +
  geom_histogram(aes(y = after_stat(density)), bins = 30, fill = "gray80", color =
"black") +
  stat_function(fun = dnorm, args = list(mean = mean(diamonds$price), sd =
sd(diamonds$price)), color = "blue", size = 1) +
  labs(title = "Histogram of Diamond Prices", x = "Price", y = "Density") +
  theme_minimal(base_size = 15)

# Bar Plot
bar_plot <- diamonds %>%
  group_by(cut) %>%
  summarise(count = n()) %>%
  ggplot(aes(x = cut, y = count, fill = cut)) +
  geom_bar(stat = "identity") +
  labs(title = "Bar Plot: Count of Diamonds by Cut", x = "Cut", y = "Count") +
  scale_fill_manual(values = palette_cut) +
  theme_minimal(base_size = 15)

# Box Plot
box_plot <- ggplot(diamonds, aes(x = cut, y = price, fill = cut)) +
  geom_boxplot() +
  labs(title = "Box Plot: Price Distribution by Cut", x = "Cut", y = "Price") +
  scale_fill_manual(values = palette_cut) +
  theme_minimal(base_size = 15)

# Scatter Plot
facet_scatter <- ggplot(diamonds, aes(x = carat, y = price, color = color)) +
  geom_point(alpha = 0.5, size = 2) +
  facet_wrap(~ cut) +
  labs(title = "Faceted Scatter Plot: Carat vs Price by Color", x = "Carat", y = "Price")
+
  scale_color_brewer(palette = "Set1") +
  theme_minimal(base_size = 15)

# Heatmap
heatmap_data <- diamonds %>%
  group_by(cut, color) %>%
  summarise(avg_price = mean(price), .groups = "drop") # Avoid warning

heatmap <- ggplot(heatmap_data, aes(x = cut, y = color, fill = avg_price)) +
  geom_tile(color = "white") +
  scale_fill_gradient(low = "lightblue", high = "darkblue") +
  labs(title = "Heatmap: Average Price by Cut and Color", x = "Cut", y = "Color") +
  theme_minimal(base_size = 15)

# Pie Chart
pie_data <- diamonds %>%
  group_by(cut) %>%
  summarise(count = n()) %>%
  mutate(percentage = count / sum(count))

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pie_chart <- ggplot(pie_data, aes(x = "", y = percentage, fill = cut)) +
  geom_bar(stat = "identity", width = 1) +
  coord_polar(theta = "y") +
  labs(title = "Pie Chart of Diamond Cuts") +
  scale_fill_brewer(palette = "Dark2") +
  theme_void(base_size = 15)
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# Arrange all plots in a 2x3 grid layout
grid.arrange(
  hist_plot, bar_plot,
  box_plot, facet_scatter,
  heatmap, pie_chart,
  ncol = 2 # Arranging in two columns for 2x3 layout
)
```

