**Step 1: Basic Exploration Using .describe(), .info(), .value\_counts()**

**📋 Dataset Information (.info()):**

* **Rows: 891**
* **Columns: 12**
* **Missing values:**
  + **Age: 177 missing**
  + **Cabin: 687 missing**
  + **Embarked: 2 missing**

**📊 Descriptive Statistics (.describe()):**

* **Average Age: 29.7 years (min: 0.42, max: 80)**
* **Average Fare: $32.20 (max: $512.33)**
* **Survival Rate: ~38.4% survived**
* **Pclass:**
  + **1st Class: 216**
  + **2nd Class: 184**
  + **3rd Class: 491**

**🔢 Value Counts:**

* **Sex:**
  + **Male: 577**
  + **Female: 314**
* **Embarked:**
  + **S: 644**
  + **C: 168**
  + **Q: 77**

**✅ Step 2: Visual Exploration — Correlation Heatmap**

**🔥 Key Insights from the Heatmap:**

* **Survival positively correlates with Fare (0.26): Higher fares slightly increased survival chances.**
* **Survival negatively correlates with Pclass (-0.34): 1st class passengers were more likely to survive.**
* **Fare strongly inversely correlated with Pclass (-0.55): As expected, 1st class passengers paid more.**

**A screenshot of a computer screen

AI-generated content may be incorrect.**

**✅ Step 3: Identifying Relationships and Trends (Expected Findings)**

1. **Age Distribution by Survival:**
   * **Many survivors were children or young adults.**
   * **Non-survivors were spread more evenly across ages.**
2. **Fare vs Survival (Boxplot):**
   * **Survivors generally paid higher fares.**
   * **There were a few outliers who paid very high fares and survived.**
3. **Age by Pclass (Boxplot):**
   * **1st class passengers were slightly older on average.**
   * **3rd class passengers had the widest age spread.**
4. **Survival Count by Sex:**
   * **Females had a significantly higher survival rate than males.**
   * **Strong gender bias in survival, likely due to the "women and children first" evacuation practice.**

**✅ Step 4: Observations for Each Visual**

**Here are detailed observations based on the expected plots and trends from the Titanic dataset:**

**📊 1. Age Distribution by Survival**

* **Observation: A greater proportion of children and younger passengers survived.**
* **Insight: This suggests priority was given to younger individuals during evacuation.**

**💰 2. Fare vs Survival (Boxplot)**

* **Observation: Survivors tend to have paid higher fares than non-survivors.**
* **Insight: Passengers in 1st class, who paid more, had better access to lifeboats and safety protocols.**

**🧓 3. Age by Pclass**

* **Observation:**
  + **1st class had older passengers on average.**
  + **3rd class included many young adults and children.**
* **Insight: Class stratification might have influenced survival access, regardless of age.**

**🚻 4. Survival Count by Sex**

* **Observation: A much higher proportion of females survived compared to males.**
* **Insight: Clear evidence of “women and children first” policy being followed.**