TASK 5 (TITANIC DATASET)

1. Passenger Demographics

- **Gender distribution**:
  The dataset contains more male passengers than female passengers. This imbalance plays a crucial role in survival outcomes.
- **Age distribution**:
  Passengers ranged from infants (less than 1 year old) to elderly individuals (over 70 years).
  The majority of passengers were between **20–40 years old**.
- **Class distribution (Pclass)**:
  Third class passengers form the largest group, followed by first and second class.

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2. Survival Rates

- **Overall survival rate**:
  Less than **40%** of passengers survived.
- **By Gender**:
  - Female passengers had a survival rate exceeding **70%**,
    whereas male survival rate was below **20%**.
    → Strong evidence of the "women and children first" policy.
- **By Class**:
  - First class survival rate: **~63%**
  - Second class survival rate: **~47%**
  - Third class survival rate: **~24%**
    → Wealth and cabin location strongly impacted survival odds.
- **By Age**:
  - Children (under 15) had higher chances of survival compared to adults, particularly in third class.
  - Elderly passengers had much lower survival rates.
- **By Family Size**:
  - Small families (1–3 members) had better survival odds than passengers traveling alone or in very large families (5+ members).

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3. Relationship Insights

- **Fare vs Survival**:
  Higher fare paid correlates with higher survival probability — mostly because wealthier passengers were in first or second class, closer to lifeboats.
- **Pclass & Sex Interaction**:
  - Female passengers in first and second class had extremely high survival rates.
  - Male passengers in third class had the lowest survival rate of all groups.

- **Correlation Heatmap**:
  - `Survived` is negatively correlated with `Pclass` (lower class number = higher survival).
  - `Fare` is positively correlated with `Survived`.
  - Age shows a weaker, slightly negative correlation with survival.

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4. Observed Trends

- **Clear social class divide** in survival — first-class passengers were more likely to survive, partly due to their location on the ship and quicker access to lifeboats.
- **Gender was a critical factor** — females, regardless of class, had a much higher chance of survival than males.
- **Younger age helped** — especially for children traveling with parents.
- **Large families struggled** — logistic challenges and separation during evacuation likely contributed to lower survival rates.

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5. Possible Real-World Interpretation

- The evacuation strategy prioritized **women, children, and first-class passengers**.
- Lifeboat capacity was insufficient, and third-class passengers had reduced access to them.
- Economic and social status influenced both **physical location** on the ship and **priority during rescue operations**.