1. (20 pts) Suppose the supply curve for a certain commodity is given by \( p = q^2 - q + 1 \) and the demand curve by \( p = 17 - q \).

   a) Find the equilibrium quantity and price.
   b) Find the producer surplus.
   c) Find the consumer surplus.
   d) Find the total gains from trade.

2. (10 pts) Assuming a continuous interest rate of 4\%, what is the present value of an annuity paying $10,000 per year, beginning 25 years from today and ending 50 years from today?
3. (10 pts) The waiting time in a certain clinic is never greater than 2 hours, and for 0 \leq t \leq 2, the density function is 1 - t/2. What is the probability of waiting less than 1 hour? What is the mean waiting time?

4. (20 pts) Consider a distribution with the following cumulative distribution function:

![Cumulative Distribution Image]

a) Estimate the value of the density function at \( x = 3 \) and at \( x = -1 \)
b) Estimate the median.
c) Do you think the mean will be greater than or less than the median?
5. (10 pts) Evaluate the indefinite integral $\int x^2 \cos(x^3) \, dx$.

6. (10 pts) Evaluate the indefinite integral $\int (t + 1)e^{-t} \, dt$.

7. (20 pts) Evaluate the following definite integrals:
   a) (10 pts) $\int_0^\pi \sin x + 2 \cos x \, dx$
   b) (10 pts) $\int_0^1 \frac{2x}{x^2 + 1} \, dx$
   c) (bonus question: 5 pts) $\int_1^\infty \frac{1}{x^2} \, dx$