

Name: _____

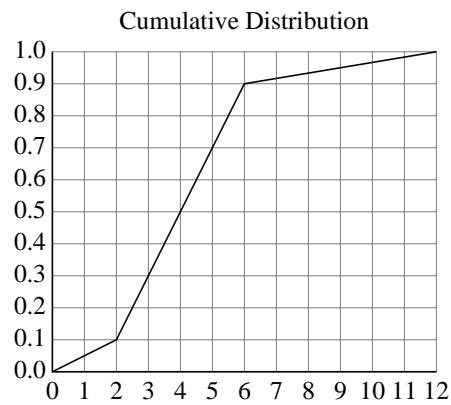
1. (20 pts) Suppose the supply curve for a certain commodity is given by $p = q^2 - q + 1$ and the demand curve by $p = 17 - q$.

- 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:



- 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) $\int_1^\infty \frac{1}{x^3} dx$