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57:022 Principles of Design II - Quiz #3
Wednesday, February 13, 2002
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Indicate "+" for true, "O" for false.

___ 1. The "Cumulative Distribution Function" (CDF) of a random variable *X* is defined as $F(x) = P\{X \le x\}$.

___ 2. The rejection method for generating a random number *x* having a CDF F(x) requires that you derive the inverse function $F^{-1}(\bullet)$, obtain two random numbers (*x,y*) having *uniform* distribution in [0,1]. If $y \le F^{-1}(x)$ then we accept *x* as the random number, else repeat.

___ 3. The inverse transformation method can always be used to generate a random number with distribution function F, provided you can calculate its inverse $F^{-1}(\bullet)$.

___ 4. The inverse transformation method (if it can be used) will always require fewer uniformly-generated random numbers than the rejection method.

___ 5. If the random variable R is uniformly distributed in [0,1], then $-\dfrac{\ln(1-R)}{\lambda}$ has Poisson distribution with parameter λ.

___ 6. In a Poisson process, the time between arrivals has a Poisson distribution.

___ 7. The inverse transformation method to generate a random number can be used to simulate interarrival times for a Poisson process.

___ 8. In a Poisson process with arrival rate λ/minute, the number of arrivals in t minutes is random, with a Poisson distribution having mean λt.

___ 9. The exponential distribution is a special case of the Erlang distribution.

___ 10. If F(t) is the CDF of the interarrival time for a Poisson process, the expected number of arrivals E_i which fail in the time interval $[t_{i-1},t_i]$ is $F(t_i) - F(t_{i-1})$

___ 11. The inverse transformation method could be used for generating random numbers having an Erlang distribution.

___ 12. If F is the CDF of a random variable X, then F(0) = 1.

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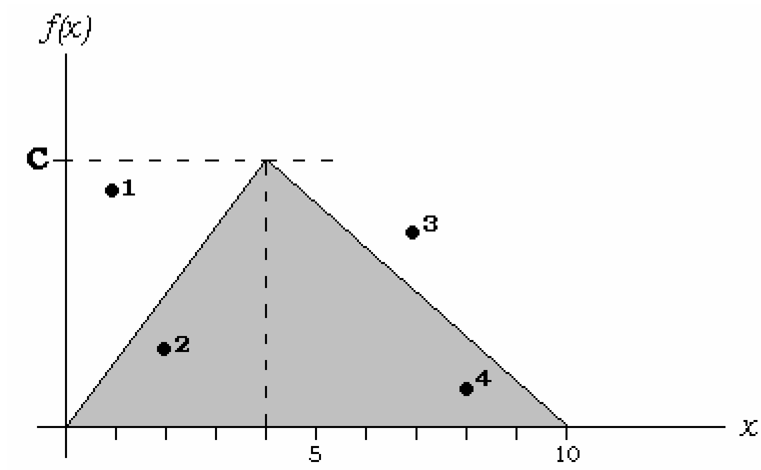
Consider the probability distribution with density function *f* shown on the right:



___ 13. The value of C must be *(choose nearest value):*

a. 0.1	b. 0.2	c. 0.3	d. 0.4
e. 0.5	f. 0.6	g. 0.7	h. 0.8
i. 0.9	j. 1.0	k. 10	l. ≥ 20

___ 14. Suppose that ***four*** pairs *(x,y)* of random numbers were generated, with *x* uniformly distributed between 0 and 10, and *y* between 0 and C, and that the four pairs were plotted as shown above. Which sequence of random numbers would have the desired distribution?

a. 1, 2, … b. 1, 7, … c. 2, 7, … d. 2, 8, …

___ 15. This method for generating random numbers is known as

a. inverse transformation method
b. triangular method
c. decomposition method
d. composition method
e. rejection method
f. *none of the above*