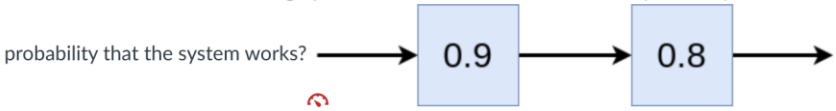
CS7280 Prerequisite test

Answering the following questions will tell you if you are ready to take the CS 7280 Network Science class. If you know how to solve the questions below or can do it with some revision of undergrad level of probability and linear algebra, then you are good to start.

Question 1 1 pts

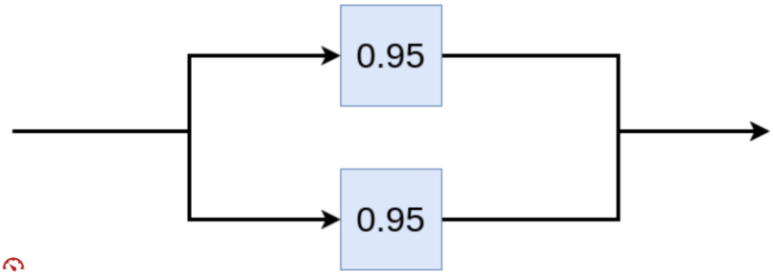
The following two-module system works only if both modules work. The probability that each module works is shown on the graph. Assume that the modules fail independently. What is the probability that the system works?



- ○ 0.81
- ○ 0.9
- ○ 0.8
- ○ 0.72

Question 2 — 1 pts

This two-module system works if at least one module works. The probability that each module works is shown on the graph. The modules fail independently. What is the probability that the system works?



- ○ 0.995
- ○ 0.005
- ○ 0.9975
- ○ 0.0025

Question 3 — 1 pts

A batch of parts contains 100 parts from Supplier A and 200 parts from Supplier B. If 4 parts are selected randomly, without replacement, what is the probability that they are all from Supplier A?

- ○ 0.9881
- ○ 0.0119
- ○ 0.9771
- ○ 0.0229

Question 4 — 1 pts

A batch of parts contains 100 parts from Supplier A and 200 parts from Supplier B. If 4 parts are selected randomly, with replacement, what is the probability that they are all from Supplier A?

- ○ 0.9877
- ○ 0.0123
- ○ 0.9771
- ○ 0.0229

Question 5 — 1 pts

Suppose that the current measurements in a strip of wire are assumed to follow a normal distribution with mean = 10 and variance = 4, what is the probability that a measurement exceeds 13? (Hint. you can use a "z-table" for the standard normal distribution)

- ○ 0.06681
- ○ 0.07982
- ○ 0.05586
- ○ 0.04389

Question 6 — 1 pts

6. Find the following limit : $lim_{x \to 0} \frac{sin(x) + x}{2x^2 + x}$

- ○ 0
- ○ 1/2
- ○ 1/4
- ○ 2

Question 7 — 1 pts

Differentiate $\ln(x)$ with respect to x,

- ○ $\frac{1}{10x}$
- ○ $\frac{1}{x}$
- ○ 0
- ○ 1

Question 8

1 pts

Integrate a^x with respect to x.

- ○ $a^x + C$
- ○ $a^{x-1} + C$
- ○ $\frac{a^x}{\ln(a)} + C$
- ○ $\frac{a^x}{\ln(x)} + C$

Question 9

1 pts

What is the functional form of the solution to the differential equation : $\frac{dx}{dt} = 5x - 3$

- ○ $x(t) = Ce^{5t} + \frac{3}{5}$
- ○ $x(t) = Ce^{5t}$
- ○ $x(t) = C\ln(5t) + \frac{3}{5}$
- ○ $x(t) = C\ln(5t)$

Question 10

1 pts

Find the eigenvalues for the matrix :

-2	1
12	-3

- ○ -1, 6
- ○ 1, -6
- ○ 2 , 3
- ○ -2 , -3

Question 11 — 1 pts

If matrix A has dimension 3x4 and matrix B has dimension 4x5, what are the dimensions of the matrix $B^T A^T$.

- ○ 3x4
- ○ 4x5
- ○ 3x5
- ○ 5x3

Question 12 — 1 pts

If a symmetric matrix has the following eigenvalue decomposition, $A = U^T Y U$, the matrix A^n , can then be computed using :

- ○ $U^{Tn} Y^n U^n$
- ○ $U^T Y^n U$
- ○ $U Y^n U^T$
- ○ All of the above

Question 13 — 1 pts

Which of the following statements are **TRUE** :

- ○ The inverse of any given matrix A exists if the matrix is singular.
- ○ The inverse of any given matrix A exists if the matrix is square symmetric.
- ○ If A is mxn and n ≤ m, then the maximum possible rank of the matrix is n.
- ○ The matrix A has an inverse if the determinant is non-negative."