ISE 362 EXAM 1 Cheat Sheet

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Reliability

Rseries = R^n

Rparallel = $1-(1-R)^n$

2 Parallel Components in Series = $(1-(1-R)^2)^2$

2 Series Components in Parallel = $1-(1-R^2)^2$

Legitimate Values of R 0<=R<=1

Consider f(R) = R(2-R) where does f(R) achieve it's max and what' the max value?

g(R) = R(2-R0 = $2R-R^2$ taking it's derivative and setting equal to 0 we get

dg(R)/dR = 2-2R=0 Its max is achieved when R=1

Plugging this in for R in g(R) yields 2-1=1>0

k out of N Redundancy - system that operates if at least k out of N components function properly.

R=Sum(I=k to n) of $R^I(1-R)^{n-i}$ (ex Sum(I=2 to 3(for ito 3)$(.0.9)^i$(-0.1)^3-i)

Economic Analysis

How much would you need to invest on September 27th, 2019 to have $10,000 on September 27th, 2027 given an interest rate of 5%?

PV = FV(P/F,i,n)=10k(P/F,5,7)

How much would you need to deposit on January 1, 2020 in a fund that yields 5% annually in order to draw out $250.00 at the end of each year starting December 31, 2020 for 7 years, leaving nothing in the fund at the end?

PV=250(P/A,5%,7)

Dominate - when one of the outcome paths is clearly the better choice for every case

Review Session Material

P34 = P[In State 4|Current State] - Take Pmatrix to the 4th power and look at position 34.

EMV(i) = SUM(j=1 to N) Pj*rij

How much does P have to change before another alternative is best. Add a z to one state and subtract z from another state, then set the equations = to each other and solve for z. If z is (-) then it's not better.

EV of Perfect information means you take the largest value at each state and multiply it by it's probability.

Expected Loss of Sales cost (When D exceeds inventory)

E[lost sales cost | Demand=d,Inv=I]

MAX(d-i,0)

To remove a condition

E[lost sales] = SUM(d=0 to nd)SUM(I=0 to ni)*max(d-i,0)*Pd(d)*Pi(i)

Can also use PMF (PI)

Markov Case

Markov Case Stochastic process where we only take into account the present to predict the future. That is the probability of going to state j(future) from state I(present)

-If there is one (and only one) closed, aperiodic communicating class, the process is ergodic.

Pi(n) = P[In state after transitions]

Pi(1) = Pi1(0)*p11 + Pi2(0)*P21+...+ Pin(0)*Pn1

Floyd's Barbershop

Haircuts take exactly 15min, we have

r.v. Y = # customers who arrive during a 15m interval

Haircuts cost 10; each customer consumes $1 of snacks every 15min

Pi(n) = Pi(n-1)*P

$=Pi(0)*p^n$

Q1 - We have 3 customers in the shop, what's the Probability there will be 4 customers in the shop 4 periods from now? A - $P^4$34

What is the probability in the long run, a customer comes to the shop but leaves because there is no seat available?

P[A]=SUM(I=0 to 4]P(A|Statei)*P(Statei)

What is the Long run expected number of customers that come to the shop but leaves? E[A] = SUM(I=1 to n) E[A|B}*P[Bi]

E[a|state=0] = 0(.2) +0(.7) ......