A particle moves on the states 1, 2, 3, and 4 according to a time-homogeneous Markov chain {Xn ; n ≥ 0 }

with initial distribution *p*(0) = ( .2, .8, 0, 0 ) and transition matrix : p = $\left[\begin{matrix}.6&.4&0&0\\.6&0&.4&0\\0&.6&0&.4\\0&0&.6&.4\end{matrix}\right]$

a) Draw the state diagram of the chain. Include the transition probabilities in your diagram. (+4)

b) Give *P*( *X*1= 1| *X*0= 2) . (+1)

c) Give *P*( *X*4= 2 | *X*3= 1) . (+2)

d) Give *P*( *X*5= 4 | *X*0= 1, *X*1= 2, *X*2= 3, *X*3= 4, *X*4= 3 ) . (+3)

e) Find the unconditional “path” probability *P*( *X*0= 1, *X*1= 1, *X*2= 2, *X*3= 3 ) . (+5)

f) Find $p\_{11}^{(2)} $= *P*( *X*2= 1| *X*0= 1) . (+5)