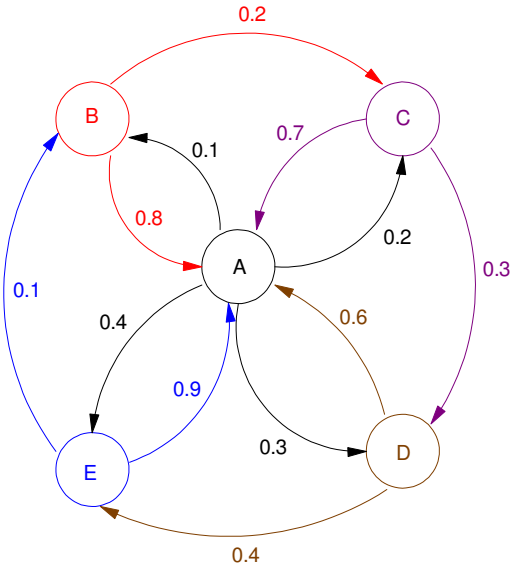
ECE 341 - Test #3: Name _____

Markov Chains and Data Analysis

1) Markov Chains: Assume five players are tossing a ball around.

- Each second the player with the ball tosses it.
- The probability that the player tosss the ball to someone else is shown below.
- At k=0, player A has the ball.



a) Express the probability that a player has the ball after k tosses as:

$$X(k+1) = MX(k)$$

where X(k) is the probability that player {A, B, C, D, E} has the ball at toss #k.

b) Determine the probability that A has the ball after 10 tosses.

- or explain how you would find this if you don't have access to Matlab

2) t-Test (One data set). A 4-sided die may or may not be loaded. If it's a fair die, the mean of the die rolls should be 2.5.

- Use a t-test to determine the probability that the mean of the die is in the range of (2.4, 2.6)
- (i.e. is this a fair die?)
- note: This is population question

1's	2's	3's	4's	mean	st dev	# rolls
29	20	31	20	2.4200	1.1117	100

$$p(2.4 < \mu < 2.6) = ?$$

3) t-Test (Two data sets): Two four-sided dice are rolled N times. They might be fair dice, they might both be loaded dice.

Determine the probability that the mean of die A is within 0.1 of the mean of B

- i.e. $-0.1 < \mu_a - \mu_b < 0.1$
- note: this is a population question

	1's	2's	3's	4's	mean	st dev	# rolls
A	29	20	31	20	2.4200	1.1117	100
B	14	23	22	21	2.6250	1.0599	80

$$p(-0.1 < \mu_a - \mu_b < +0.1) = ?$$

4) Chi-Squared Test: A 4-sided die is rolled 100 times. Determine if this is a fair die using a chi-squared test

1's	2's	3's	4's	mean	st dev	# rolls
29	20	31	20	2.4200	1.1117	100

5) ANOVA (Three data sets): Three 4-sided dice are rolled. They may or may not be loaded.

Use an ANOVA test to determine if the three dice have the same mean

	1's	2's	3's	4's	mean	st dev	# rolls
A	29	20	31	20	2.4200	1.1117	100
B	14	23	22	21	2.6250	1.0599	80
C	20	12	14	14	2.3667	1.1784	60