(15pts) NAME (printed neatly): _____

(5pts) Section Number (circle correct section): 521(9:10am) 522 (10:20am) 514 (11:30am) 525(1:50pm)

Quiz Grade: _____ **CIRCLE THE CORRECT ANSWERS; NO PARTIAL CREDIT.**

1. Eleven years ago the Spring Fairy bought a $156,000 fairy nest with a 20% down payment and by financing the balance. The 30-year mortgage had a 6.75% per year interest rate compounded monthly. Because the interest rates have dropped to 5.65% per year compounded monthly, the Spring Fairy is refinancing her fairy nest with a 15-year mortgage at the lower interest rate. Assume there are no refinancing fees.

a. (10pts) Under the original mortgage, what was the Spring Fairy's monthly mortgage payment?

A. $4232.53
B. $4532.53
C. $809.45
D. $202.36
E. none of these
F. $720.39

b. (10pts) If the spring fairy had kept the original mortgage for 30 years, how much total interest would she have paid?

A. $260,202
B. $183,655
C. None of these
D. $18012
E. $166,602
F. $135,402

c. (10pts) After the first 11 years, what is the Spring Fairy's home equity?

A. $80,726.73
B. $49,526.73
C. $63,577.68
D. $52,151.74
E. $103,848.26
F. none of these

d. (10pts) After refinancing, what is the Spring Fairy's new monthly mortgage payment?

A. $918.96
B. none of these
C. $743.85
D. $599.45
E. $824.56
F. $856.82

2. A survey was conducted among local Texas A&M students. Results of the survey showed that 60% ate their evening meal at their off-campus home, 25% ate their evening meal on campus, and the rest ate at an off-campus restaurant. Furthermore, it was found that of those eating their evening meal at their off-campus home during day one, 82% would eat the evening meal at their off-campus home the next day, 15% would eat on campus, and 3% would eat at an off-campus restaurant. It was found that of those eating their evening meal on campus during day one, 8% would eat the evening meal at their off-campus home the next day, 76% would eat on campus again, and 16% would eat at an off-campus restaurant. It was also found that of those eating their evening meal at an off-campus restaurant during day one, 54% would eat the evening meal at their off-campus home the next day, 12% would eat on campus, and 34% would eat at an off-campus restaurant.

a. (10pts) If this trend continues, what will be the percentage, to 2 decimal places, of students that will eat in each place after 1 week?

A. none of these
B. 59.30% eat at home; 29.80% eat on campus; 10.90% eat at an off-campus restaurant
C. 52.48% eat at home; 36.56% eat on campus; 10.97% eat at an off-campus restaurant
D. 48.40% eat at home; 39.37% eat on campus; 12.23% eat at an off-campus restaurant
E. 51.52% eat at home; 37.22% eat on campus; 11.27% eat at an off-campus restaurant
F. 52.86% eat at home; 36.27% eat on campus; 10.87% eat at an off-campus restaurant

b. (16pts) If this trend continues and if there are 40,040 students, how many will eat in each place in the long run?

A. 20,767 eat at home; 14,804 eat on campus; 4469 eat at an off-campus restaurant
B. 20,416 eat at home; 15,048 eat on campus; 4576 eat at an off-campus restaurant
C. 23,744 eat at home; 11,932 eat on campus; 4364 eat at an off-campus restaurant
D. none of these
E. 20,627 eat at home; 14,902 eat on campus; 4511 eat at an off-campus restaurant
F. 32833 eat at home; 6006 eat on campus; 1201 eat at an off-campus restaurant

3. (14pts) Circle all the stochastic matrices that are regular.

A stochastic matrix is any square matrix that has all nonnegative entries and the sum of each column is one. A stochastic matrix T is regular if and only if some power of T has all positive entries.

$$A=\begin{bmatrix} 0.3 & -0.4 & 0.1 \\ 0.5 & 0.8 & 0.2 \\ 0.2 & 0.6 & 0.7 \end{bmatrix}$$

$$B=\begin{bmatrix} 0.2 & 0.6 \\ 0.4 & 0.1 \\ 0.4 & 0.3 \end{bmatrix}$$

$$C=\begin{bmatrix} 0.2 & 0.7 & 0.5 \\ 0.3 & 0.1 & 0.1 \\ 0.5 & 0.2 & 0.4 \end{bmatrix}$$ **STOCHASTIC REGULAR**

$$D=\begin{bmatrix} 0.2 & 0.3 & 0.5 \\ 0.1 & 0.3 & 0.6 \\ 0.8 & 0.1 & 0.1 \end{bmatrix}$$

$$E=\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$F=\begin{bmatrix} 0.8 & 0.4 & 0 \\ 0 & 0.1 & 1 \\ 0.2 & 0.5 & 0 \end{bmatrix}$$ **STOCHASTIC REGULAR**

$$G=\begin{bmatrix} 0.4 & 0.2 & 0.9 \\ 0.6 & 0.8 & 0.1 \end{bmatrix}$$