

Student: _____
Date: _____

Instructor: Bahir Masadeh
Course: honors math

Assignment: Test 2(MAT2270)

1. Consider the weighted voting system $[q; 16, 14, 12, 6, 3]$.

- What is the smallest value that the quota q can take?
- What is the largest value that the quota q can take?
- What is the value of the quota if *at least* two-thirds of the votes are required to pass a motion?
- What is the value of the quota if *more* than two-thirds of the votes are required to pass a motion?

- The smallest value that the quota q can take is _____.
- The largest value that the quota q can take is _____.
- The quota if *at least* two-thirds of the votes are required is _____.
- The quota if *more* than two-thirds of the votes are required is _____.

2. A weighted voting system with four players has the following winning coalitions (with critical players underlined):

$$\{\underline{P_1}, P_2\}, \{\underline{P_1}, P_2, P_3\}, \{\underline{P_1}, P_2, P_4\}, \{\underline{P_1}, P_3, P_4\}, \{\underline{P_1}, P_2, P_3, P_4\}$$

Find the Banzhaf power distribution of this weighted voting system.

Find the Banzhaf power distribution for this system.

$$\beta_1 = \underline{\hspace{2cm}}, \beta_2 = \underline{\hspace{2cm}}, \beta_3 = \underline{\hspace{2cm}}, \beta_4 = \underline{\hspace{2cm}}$$

(Type integers or simplified fractions.)

3. Suppose you borrow \$875 for a term of three years at simple interest and 3.73% APR. Determine the total (principal plus interest) you must pay back on the loan.

The total (principal plus interest) you must pay back on the loan is \$ _____.
(Round to the nearest cent as needed.)

4. Suppose you purchase a 25-year U.S. savings bond with an APR of 2.5%. The face value of the bond is \$7000. Find the purchase price of the bond.

The purchase price of the bond is \$ _____.
(Round to the nearest cent as needed.)

5. There is a payday loan company that offers quick, short-term loans using the borrower's future paychecks as collateral. This company charges \$16 for each \$100 loaned for a term of 14 days. Find the APR charged by this company.

The APR charged by this company is _____.
(Round to the nearest hundredth as needed.)

6. Consider a CD paying a 4% APR compounded continuously. Find the future value of the CD if you invest \$1320 for a term of 500 days.

The future value is \$ _____.
(Round to the nearest cent as needed.)

7. Using set notation, write out the sample space for each of the following random experiments.

- (a) A coin is tossed two times in a row. The observation is how the coin lands (H or T) on each toss.
 - (b) A basketball player shoots four consecutive free throws. The observation is the result of each free throw (s for success, f for failure).
 - (c) A coin is tossed two times in a row. The observation is the number of times the coin comes up tails.
 - (d) A basketball player shoots three consecutive free throws. The observation is the number of successes.
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(a) Choose the correct answer below.

- ☐ A. {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}
- ☐ B. {0, 1, 2, 3}
- ☐ C. {0, 1, 2}
- ☐ D. {HH, HT, TH, TT}

(b) Choose the correct answer below.

- ☐ A. {0, 1, 2, 3, 4}
- ☐ B. {sss, ssf, sfs, fss, sff, fsf, ffs, fff}
- ☐ C. {ssss, sssf, ssfs, sfss, fsss, ssff, sfsf, fssf, sffs, fsfs, ffss, sfff, fsff, ffsf, fffs, ffff}
- ☐ D. {0, 1, 2, 3}

(c) Choose the correct answer below.

- ☐ A. {0, 1, 2, 3}
- ☐ B. {HH, HT, TH, TT}
- ☐ C. {0, 1, 2}
- ☐ D. {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

(d) Choose the correct answer below.

- ☐ A. {0, 1, 2, 3, 4}
 - ☐ B. {sss, ssf, sfs, fss, sff, fsf, ffs, fff}
 - ☐ C. {0, 1, 2, 3}
 - ☐ D. {ssss, sssf, ssfs, sfss, fsss, ssff, sfsf, fssf, sffs, fsfs, ffss, sfff, fsff, ffsf, fffs, ffff}
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8. The board of directors of the XYZ Corporation has 14 members. In parts (a) and (b), give your answer using the notation ${}_nP_r$ or ${}_nC_r$. You do not have to give an actual numerical answer, so you won't need a calculator.

- (a) How many different slates of four members (a President, a Vice President, a Treasurer, and a Secretary) can be chosen?
- (b) How many delegations of four members (all members are equal) can be chosen?

(a) Choose the correct answer below.

- ☐ A. ${}_{14}P_4$
- ☐ B. ${}_{14}C_4$
- ☐ C. ${}_4P_{14}$
- ☐ D. ${}_4C_{14}$

(b) Choose the correct answer below.

- ☐ A. ${}_4P_{14}$
- ☐ B. ${}_{14}C_4$
- ☐ C. ${}_4C_{14}$
- ☐ D. ${}_{14}P_4$

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9. In each case, find the probability of an event E having the given odds.

- (a) The odds in favor of E are 2 to 5.
- (b) The odds against E are 7 to 19.

(a) The probability of an event E occurring is _____.
(Type an integer or a simplified fraction.)

(b) The probability of an event E occurring is _____.
(Type an integer or a simplified fraction.)