# MAT 230 Exam One

**General:**

* Before beginning this homework, be sure to read the textbook sections and the material in Modules One through Four.
* Type your solutions into this document and be sure to show all steps for arriving at your solution. Just giving a final number may not receive full credit.
* You may copy and paste mathematical symbols from the statements of the questions into your solution. This document was created using the Arial Unicode font.
* These homework problems are proprietary to SNHU COCE. They may not be posted on any non-SNHU website.
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1. Consider the following sets:

U = {a, b, c, d, e, f, g, h}

A = {b, c, d, f, g}

B = {a, c, d, g, h}

C = {a, c, e}

Represent each of the following with an array of zeros and ones:

1. A ∩ B
2. B – C
3. 
4. 0, 0, 1, 1, 0, 0, 1, 0
5. 0, 0, 0, 1, 0, 0, 1, 1
6. 0, 0, 0, 0, 0, 0, 0, 1
7. Use the following propositions:

p: I will wear my lucky hat.

q: My team will win tonight.

to write the following statements in terms of p, q, and logical connectives (~, ∨, ∧, →, and ↔). Which of these, if any, are equivalent to each other? Explain your answers.

1. If I wear my lucky hat, then my team will win tonight.
2. My team will win tonight only if I wear my lucky hat.
3. If I do not wear my lucky hat, then my team will not win tonight.
4. Wearing my lucky hat is a sufficient condition for my team to win tonight.

Answers a, c, and d are equivalent to each other.

1. Let P(x) be the predicate that “x has orange feet” where the variable x represents pelicans. Consider the statement “There does not exist a pelican that has orange feet.”
   1. Write an equivalent English statement that begins with “Every pelican …”.
   2. Write the statement “There does not exist a pelican that has orange feet” symbolically using P(x) and quantifiers (∀, ∃).
   3. Write your English statement answer from part a) symbolically using P(x) and quantifiers (∀, ∃).
2. Every pelican has orange feet.
3. Use Bacon’s code and the dummy message “mathematics is very fun” to encode the word OUCH. For the sake of readability, use lowercase letters for 0 and uppercase letters for 1.

O U C H

01110 10100 00010 00111

mATHe MaTic sisVe ryFUN

1. A company is holding a sales contest for its sales reps. 12 sales reps are based in Office A and 7 sales reps are based in Office B. Bonuses of $800, $400, and $200 will be given to the top 3 sales reps in Office A. Bonuses of $500 and $250 will be given to the top 2 sales reps in Office B. In how many different ways can the bonuses be paid out?

Using the slot method:

Office A has three awards given. First will be out of a pool of 12 reps, second pool will be 11, third will be 10. Multiply together and our answer is 1,320 ways for the bonuses to be delivered in Office A.

Office B has two awards to be given. First will be out of a pool of 7 and the second pool will be 6. Multiply together and our answer is 42 ways for the bonuses to be delivered in Office B.

1. How many distinguishable permutations can be made of the letters in the word STEGOSAURUS?

The number of distinguishable permutations that can be formed from a collection of n objects where the first object appears times, the second object appears times, and so on is

So for STEGOSAURUS, that gives us