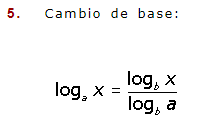
**MIDTERM**

Guys, this is what a remember about MIDTERM:

* Prove Log10 (n) = Log2 (n), the solution is with this property of the logarithms:



a = 10, x = n, b = 2, so:

Log10 (n) = Log2 (n)/ Log2 (10)

Since Log2 (10) is constant, **Log10 (n) = Log2 (n)**

* Inversion Bound algorithms [O (n^2)]:
  + Insertion sort.
  + Selection sort
  + Bubble sort
* Comparison based algorithms [O (n\*log(n))]:
  + Merge sort
  + Quicksort
* Probability problem:
  + Bucket with 20 pieces, 8 red, 9 blue and 3 green.
    - What is the probability of get a green piece: 1/p => 1/(3/20) => **20/3**
    - What is the probability of get 6 green pieces: k/p => 6/(3/20) => **40**
    - What is the probability of red ones before a get 6 green pieces: kq/p => 6(8/20)/(3/20) => **16**.
* Prove Log(n!) is O(n\*log(n)), this answer is in ***Algorithms.pdf***, page 16 (Decision Tree).
* What is the sum of these values: 19, 119, 219,…, 2019:
  + This is an arithmetic series, the formula is: [(firstValue + lastValue)\*#Values]/2:
    - First value: 19
    - Last value: 2019
    - # values: 21
    - Result: [(2019 + 19)\*21]/2 => **21399**
* What is the sum of these values: ¾ + (3/4)^3 + (3/4)^5 + (3/4)^7 + …
  + This is an infinite series, the formula is: a/1-r
    - a = ¾
    - r = (¾)^2
    - Result: (3/4)/(1-(3/4)^2) => (3/4)/(1-9/16) => (3/4)/(7/16) => **12/7**
* One point was about QuickSort or QuickSelect, write every step of the algorithm, just like the examples in document ***Algorithms.pdf*** page 14 and 15.
* One point was about order big Oh’s, just like Homework ***LAB W1D2.docx***, last point.
* One point was about Master Formula:
  + Use master formula to find Big Oh,
  + Second part is proved it without master formula (induction), example of this is in document ***Algorithms.pdf*** page 2, 3 and 4, and in document ***Recurrence Relations.pdf***.
* Prove by induction that 1^3+ 2^3+ 3^3 + …+ n^2 = … sorry, don’t remember exactly the equivalency.