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CSCI 243 Spring 2011 HW0

1. With only two variables, we can construct the following truth table:

p	q	$p \wedge q$	$p \oplus q$	$\neg p \rightarrow q$
T	T	T	F	T
T	F	F	T	T
F	T	F	T	T
F	F	F	F	F

2. It's an identity matrix!

$$I = \begin{bmatrix} 1 & 0 & \cdots & 0 \\ 0 & 1 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & 1 \end{bmatrix}$$

3. Here is my awesome picture from xfig, which was 3 inches by 2 inches, and is centered and scaled to 50% of the width of my text!

Figure 1: Figures love captions. So do we.

4. We can use the Binomial Theorem (which we will study later) to expand $(x+y)^4$:

$$\begin{aligned} (x+y)^4 &= \sum_{j=0}^{4} \binom{4}{j} x^{4-j} y^j \\ &= \binom{4}{0} x^4 + \binom{4}{1} x^3 y + \binom{4}{2} x y^3 + \binom{4}{4} y^4 \\ &= x^4 + 4x^3 y + 6x^2 y^2 + 4x y^3 + y^4 \end{aligned}$$

5. If you do not allow repetition, you can select exactly $\frac{n!}{r!(n-r)!}$ combinations of r elements from a set of n elements.

6. Let s represent the number of points you earn in this class. Then there is a function $L(s)$ that determines your letter grade. Fortunately the follwing is not the definition of $L(s)$ that we will use in this class:

$$L(s) = \begin{cases} A+ & : s \geq 97 \\ A & : 93 \leq s < 97 \\ A- & : 90 \leq s < 93 \\ F & : s < 90 \end{cases}$$

7. We are going to talk about lots of mathy things in this class, including:

   (a) counting
   (b) induction
   (c) functions

   Of course, some of it will be about other things, such as:

- graphs
- trees
- formal languages
- turing machines

Oh wait, those are kinda mathy too. Oh well, we'll have fun!