Math 105 TOPICS IN MATHEMATICS
REGULAR HOMEWORK – V

February 9 (Mon), 2015

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Line #: 52920.

⋆ **Due date:** **Wednesday, February 11th, 2015** .

⋆ **Your paper will be collected in class. No late homework will be accepted.**
Please see "Rules, Policies and Protocols " p.14 about homework policy.

[I] (6pts) (1) $0^{12} = ?$ (2) $1^{24} = ?$ (3) $\Big(-1\Big)^{99} = ?$

[II] (6pts) Spell out each of the following binomial coefficients, in the fraction form. You don't have to calculate the answers.

(1) $\binom{11}{4}$. (2) $\binom{24}{7}$. (3) $\binom{100}{12}$.

[III] (8pts) Spell out the binomial formula for each of

(a) $\Big(x + y\Big)^5$, and (b) $\Big(x + y\Big)^6$.

In each of (a), (b), first give the formula that includes the notation $\binom{n}{k}$. Then convert those $\binom{n}{k}$ into numbers and rewrite your answer accordingly.

[IV] (10pts) (1) $2^{11} - 1$ is written as a product of two primes. One of the two primes is 23. What is the other prime? Show work.

(2) True or false : "*If* n *is a prime, then* $2^n - 1$ *is a prime.*"

(3) True or false : "*If* $2^n - 1$ *is a prime, then* n *is a prime.*"

(4) True or false : "*If* $2^n + 1$ *is a prime, then* n *is a 2-to-the-power.*"

(5) Is $2^{32} + 1$ a prime? If not, what is the smallest prime that divides $2^{32} + 1$?