Graph Theory: Lecture No. 36

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For every integer $k \geq 3$, the Ramsey number of $k$ satisfies: $R(k) > 2^{k/2}$
The Mean or Expected Value of a random variable $X$ is the number

$$E(X) = \sum_{G \in \mathcal{G}(n,p)} P(G).X(G).$$
Markov’s Inequality: Let $X \geq 0$, be a random variable on $G(n, p)$ and $a > 0$. Then

\[ P[X \geq a] \leq \frac{E(X)}{a} \]
The expected number of $k$-cycles in $G \in \mathcal{G}(n, p)$, is $E(X) = \frac{(n)_k}{2k} p^k$. 
Let $k > 0$ be an integer, and let $p = p(n)$ be a function of $n$ such that $p \geq (6k \ln n)/n$ for large $n$. Then $\lim_{n \to \infty} P(\alpha \geq \frac{n}{2k}) = 0$
For every integer $k$, there exists a graph $H$ with girth $g(H) > k$ and chromatic number $\chi(H) > k$. 