1035-05-92 **Steven J Miller*** (sjmiller@math.brown.edu), Mathematics Department, Brown University, Providence, RI, **Tim Novikoff** (tnovikoff@gmail.com), Mathematics Department, Cornell University, Ithaca, NY 14853, and **Anthony Sabelli** (Anthony_Sabelli@brown.edu), Mathematics Department, Brown University, Providence, RI 02912. *On the Probability that Random Graphs are Ramanujan.*

Recently Friedman proved Alon's conjecture for many families of d-regular graphs, namely that given any $\epsilon > 0$ 'most' graphs have second largest eigenvalue at most $2\sqrt{d-1} + \epsilon$; if the second largest eigenvalue is at most $2\sqrt{d-1}$ then the graph is said to be Ramanujan. These graphs have important applications in communication network theory, allowing the construction of superconcentrators and nonblocking networks, coding theory and cryptography. As many of these applications depend on the size of the second largest eigenvalue, it is natural to investigate its distribution, which we show is well-modeled by the $\beta = 1$ Tracy-Widom distribution. If the observed growth rates of the mean and standard deviation as a function of the number of vertices holds in the limit, then in the limit approximately 52% of d-regular graphs from these families should be Ramanujan. (Received September 04, 2007)