General Mathematics and Computational Science I

Exercise 13

November 14, 2006

1. (From Ivanov, p. 28.) Let

$$a_n = \frac{n!}{n^n} \, .$$

   Show that

$$\lim_{n \to \infty} \frac{a_n}{a_{n+1}} = e \, .$$

2. Use Stirling's formula to prove that

$$\frac{n!}{(n/2)!^2} \sim 2^n \sqrt{\frac{2}{\pi n}} \, .$$