

General Mathematics and Computational Science I

Exercise 15

November 8, 2005

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

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

Show that

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

2. Use Stirling's formula to prove that

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