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Quiz 11

This quiz is graded out of 10 marks. No books, graphing calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §9.6#13 *(10 marks)* Determine the convergence or divergence of the infinite series.

$$\sum_{n=0}^{\infty} \frac{n!}{3^n}$$ Lets use the ratio test. $a_n = \frac{n!}{3^n}$ $a_{n+1} = \frac{(n+1)!}{3^{n+1}}$

$$\lim_{n \to \infty} \left| \frac{a_{n+1}}{a_n} \right|$$

$$= \lim_{n \to \infty} \left| a_{n+1} \cdot \left(\frac{1}{a_n} \right) \right|$$

$$= \lim_{n \to \infty} \left| \frac{(n+1)!}{3^{n+1}} \frac{3^n}{n!} \right|$$

$$= \lim_{n \to \infty} \frac{n!(n+1) \cdot 3^n}{3 \cdot 3^n \, n!}$$

$$= \lim_{n \to \infty} \frac{n+1}{3}$$

diverges, therefore the infinite series diverge by the ratio test.