

Homework 10: Sequences and Series (due April 3)

1.(G. Series) Write $2.\overline{627}$ as a rational number. (Hint: $2.\overline{627} = 2 + 0.\overline{627}$)

2.(G Series) Show that $0.9999999999\dots$ is actually equal to 1.

3.(G. Series) Evaluate

$$3 - \frac{3}{2} + \frac{3}{4} - \frac{3}{8} + \dots$$

4.(G. Series) Evaluate

$$\frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \dots$$

5.(Comparison Test) Determine whether the series converges or diverges. Then prove your result:

(a) $\sum_{n=0}^{\infty} \frac{4}{2n+1}$

(b) $\sum_{n=0}^{\infty} \frac{2n}{1+n^4}$

(c) $\sum_{n=0}^{\infty} \frac{2n}{\sqrt{4+n^2}}$

(d) $\sum_{n=1}^{\infty} \frac{n+2^n}{n^3 2^n}$

(e) $\sum_{n=0}^{\infty} \frac{n}{\sqrt{n^5+1}}$

6. Use the ratio test to decide if the series converges:

(a) $\sum_{n=0}^{\infty} \frac{(-100)^n}{n!}$

(b) $\sum_{n=0}^{\infty} \frac{(n!)^2}{(2n)!}$

(c) $\sum_{n=0}^{\infty} \frac{1}{r^n n!} \quad (r > 0)$