

King Saud University
Department of Mathematics

1 Mid Term Exam

280-Math

1 Semester (1439/1440)

Question1 (3+3). Determine the sup and inf of the following sets:

$$A = \{x \in \mathfrak{R}, x^2 - x - 1 < 0\}$$

$$B = \{x^2 - x - 1, x \in \mathfrak{R}\}$$

Question2 (2+2+3+3). Decide whether the sequence x_n converges with finding its limit in case of convergence:

a) $x_n = (-1)^n n \sin \frac{1}{n}$

b) $x_n = \frac{1}{n} \sin \frac{1}{n}$

c) $x_n = \frac{5^n}{n!}$

d) $x_n = \sum_{k=0}^{k=n} \frac{1}{(n+k)^2}$

Question3 (2+2+2). Determine whether the series converges:

a) $\sum_{n=1}^{\infty} \frac{\sqrt[4]{n}}{n + \sqrt{n^2 + 1}}$

b) $\sum_{n=1}^{\infty} \ln\left(1 + \frac{1}{n}\right)$

c) $\sum_{n=1}^{\infty} \ln\left(2 + \frac{2}{n^2}\right)$

Question4 (3). Determine whether the following series is absolutely convergent, conditionally

convergent or divergent: $\sum_{n=1}^{\infty} (-1)^n \ln\left(1 + \frac{1}{n}\right)$