Practice Midterm2 Version B, Sec61

Multiple Choice. Circle the best answer. No work needed. No partial credit available.

Q1 Which statement is true about the series

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

A The **nth term test** concludes that the series converges.

B The **nth term test** concludes that the series diverges.

C The **nth term test** hypotheses are not met by this series, so it cannot be applied.

D The **nth term test** hypotheses are met by this series however the test is inconclusive.

E None of the above are true. The nth term test concludes that the series converges.

Q2 Which statement is true about the series

$$\sum_{n=2}^{\infty}\frac{10n}{\sqrt{n^2+2}}$$

A The **integral test** concludes that the series converges.

B The **integral test** concludes that the series diverges.

C The **integral test** hypotheses are not met by this series, so it cannot be applied.

D The **integral test** hypotheses are met by this series however the test is inconclusive.

E None of the above are true.

Q3 Determine whether the following series are absolutely convergent, conditionally convergent, or divergent:

$$(1)\ \sum_{n=1}^{\infty} \frac{\sin(n)+1}{2^n} \qquad \text{and (2)} \quad \sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n+2}}$$

A (1) is absolutely convergent; (2) is divergent.

B (1) is conditionally convergent; (2) is divergent.

C (1) is absolutely convergent; (2) is conditionally convergent.

D (1) is divergent; (2) is conditionally convergent.

E (1) and (2) are conditionally convergent.

Q4 Determine whether the following series converge or diverge.

(a)

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

(b)

$$\sum_{n=1}^{\infty} \frac{\sqrt{n}+n^3+2n}{\sqrt{9n^8+7n}}$$

Q5 Check the convergence/divergence of

$$\sum_{n=1}^{\infty} \frac{2n+1}{n^2+n}$$

using integral test. (Note: you need to check the series satisfies ALL the THREE hypotheses of integral test.)

Q6 Find the exact arc-length of $f(x) = \frac{1}{2}x^2 - \frac{1}{4}\ln x$ from $x = 1$ to $x = 2$.

Q7 Consider the series $2 - \frac{4}{3e} + \frac{8}{9e^2} - \frac{16}{27e^3} + \cdots$. Give the value of the nth term a_n which would allow us to rewrite this series as $\sum_{n=1}^{\infty} a_n$ and find the sum.

Q8 Find the sum of the series

$$\sum_{n=1}^{\infty} \frac{2^{2n+1} - (-1)^{n-1}}{9^n}$$

Q9 Find the radius of convergence of

$$\sum_{n=0}^{\infty} \frac{(n+3)(2x-3)^n}{3^n}$$

Q11 Find the first three non-zero terms of the Maclaurin series of the function

$$f(x) = xe^x + \cos x$$

Q12 Consider the function $f(x) = \frac{3x}{2+3x^2}$. Find the power series representation of f and the radius of convergence.

Q13 Find the 4th degree Taylor polynomial of $f(x) = 3\sin(2x)$ centered at $a = \pi/8$

Q14 Find the Taylor series at $x = 0$ for $f(x) = x^2 e^{-2x}$ (find the general nth term and write it in Sigma notation).