# MA17300 Midterm Exam 3

## Practice Test 2

**Find the sum of the geometric series for those x for which the series converges.**

1) $\sum_{n=0}^{\infty} \frac{(-1)^n}{2} \frac{1}{(5+\sin x)^n}$

**Use the integral test to determine whether the series converges.**

2) $\sum_{n=1}^{\infty} \frac{\cos 1/n}{n^2}$

**Use the Comparison Test to determine if the series converges or diverges.**

3) $\sum_{n=1}^{\infty} \left(\frac{n}{4n+5}\right)^n$

**Use the limit comparison test to determine if the series converges or diverges.**

4) $\sum_{n=1}^{\infty} \frac{(\ln n)^3}{\sqrt{n}(3+2\sqrt[3]{n})}$

**Use the root test to determine if the series converges or diverges.**

5) $\sum_{n=1}^{\infty} \frac{(n!)^n}{\left(n^n\right)^9}$

**Use the ratio test to determine if the series converges or diverges.**

6) $\sum_{n=1}^{\infty} \frac{9(n!)^2}{(2n)!}$

**Determine if the series converges absolutely, converges, or diverges.**

7) $\sum_{n=1}^{\infty} (-1)^n \ln\left[\frac{6n+3}{6n+2}\right]$

**For what values of x does the series converge absolutely?**

8) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x+4)^n}{n10^n}$

**Find the first four nonzero terms in the Maclaurin series for the function.**

9) $f(x) = \sin x \cos x$

Answer Key
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1) $\frac{5+\sin x}{2(6+\sin x)}$

2) converges
3) converges
4) Diverges
5) Diverges
6) Converges
7) Converges conditionally
8) $-14 < x < 6$
9) $x - \frac{2}{3}x^3 + \frac{2}{15}x^5 - \frac{4}{315}x^7 + \ldots$