

## 1553 Spring 09 Practice Test 2

SHOW YOUR WORK. Each question is worth 10 points.

1. Use the integral test to determine whether the series  $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$  converges or diverges.
2. Determine whether the series  $\sum_{n=1}^{\infty} \frac{3n-1}{n^2-n+1}$  converges or diverges.
3. Determine whether the series  $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt{3n+2}}$  is absolutely convergent, conditionally convergent, or divergent.
4. Determine whether the series  $\sum_{n=0}^{\infty} \frac{(-5)^{n+1}}{n!}$  is absolutely convergent, conditionally convergent, or divergent.
5. Find the radius of convergence and interval of convergence of the power series

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

6. Find a power series representation for the function  $f(x) = \frac{x^2}{1+x^3}$  and determine the interval of convergence.
7. Evaluate the indefinite integral as a power series.

$$\int \frac{1}{1-x^4} dx$$

8. Use standard Maclaurin series to obtain the Maclaurin series for the given function.

(a)  $f(x) = x \sin(3x)$

(b)  $g(x) = e^{2x^2}$

9. (a) Approximate  $f(x) = \ln x$  by a Taylor polynomial of degree  $n = 2$  centered at  $a = 2$ .  
(b) Use Taylor's inequality to estimate the accuracy of this approximation for  $x$  in the interval  $1.9 \leq x \leq 2.1$ .
10. Find the slope of the tangent to the parametric curve  $x = t^3 - 2t$ ,  $y = t^2 + t$  at the point corresponding to  $t = 1$ , and the points at which the tangent is horizontal or vertical.