MATH 162 PRACTICE QUIZ V

1. For each numerical series below, determine *convergence* or *divergence*. In the case of convergence, determine if the series converges *absolutely* or *conditionally*. Justify each answer.

$$(a)\quad \sum_{m=1}^{\infty}\left(\frac{-e}{m}\right)^m$$

$$(b)\quad \sum_{n=1}^{\infty}\frac{(-1)^{3n}2^n}{\left(1+\frac{1}{n}\right)^{n^2}}$$

$$(c)\quad \sum_{n=3}^{\infty}(-1)^n\frac{5}{\ln n}$$

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

$$(e)\quad \sum_{k=1}^{\infty}(-1)^k\frac{k(k+1)(k^2+5)}{(k-13\ln k)^4}$$

$$(f)\quad \sum_{n=1}^{\infty}\frac{5^n+7}{11^n}$$

$(g)\quad \sum_{n=1}^{\infty} \frac{(-1)^{n+1}(3n)!}{(n!)^3}$

$(h)\quad \sum_{n=1}^{\infty} (-1)^n \frac{4^n (n!)^2}{(2n)!}$

2. For each of the following numerical series, determine if the series *diverges*, *converges conditionally* or *converges absolutely*. Justify your answers!

(a) $\sum_{n=1}^{\infty} (-1)^n \cos\left(\frac{1}{5+n^7 \ln n}\right)$

(b) $\sum_{n=2}^{\infty} \frac{\sin(3n+5)}{n(\ln n)^2}$

(c) $\sum_{n=3}^{\infty} (-1)^n \frac{5}{\ln n}$

(d) $\sum_{n=1}^{\infty} (-1)^n \left(\frac{1+n}{5+n^2}\right)^n$

(e) $\displaystyle\sum_{k=1}^{\infty} (-1)^k \frac{k(k+1)(k^2+5)}{(k-13\ln k)^4}$

(f) $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{2^n}{\left(1+\frac{1.3}{n}\right)^{n^2}}$

3. For each of the following *power series*, determine the *interval of convergence*. Do not study end-point behavior.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{3^n}{n(n+5)} x^n$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n(n+3)(n+11)}(x-4)^n$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{n^n}{n!}(x-1)^n$

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!}(x-4)^n$

(e) $$\sum_{n=0}^{\infty} \frac{1}{2^n \sqrt{n+1}} (x+3)^n$$

(f) $$\sum_{n=1}^{\infty} \frac{7^n}{n^5 e^n} x^n$$

Pure mathematics is, in its way, the poetry of logical ideas.

- Albert Einstein