Math 104 – Rimmer
Practice Exam 4

1. Determine the limit of the sequence

$$a_n = \sqrt{n^2 + 3n} - n$$

A) 3 B) 2 C) 1 / 2 D) 3 / 2

E) 0 F) 1 G) ∞ H) does not exist

2. Determine of the following series converges or diverges. If it converges, then find its sum.

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

A) converges, sum is 5 B) converges, sum is 3 C) converges, sum is 2

D) converges, sum is 6 E) converges, sum is 4 F) converges, sum is 7

G) diverges H) none of the above

3. Find the sum of the series

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

A) 3 / 4 B) 1 / 2 C) 3 / 5 D) 9 / 10
E) 2 / 3 F) 4 / 5 G) divergent H) none of the above

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4. Determine whether the following series are convergent or divergent. For full credit be sure to explain your reasoning.

$$\text{(I)}\sum_{n=1}^{\infty}\left(\frac{n+3}{2n-5}\right)^{n} \qquad \text{(II)}\sum_{n=1}^{\infty}\sqrt[4]{\frac{2}{n^3}} \qquad \text{(III)}\sum_{n=1}^{\infty}\frac{2^n}{n!\sqrt{n+1}}$$

	(I)	(II)	(III)
A)	convergent	convergent	convergent
B)	convergent	convergent	divergent
C)	convergent	divergent	convergent
D)	convergent	divergent	divergent
E)	divergent	convergent	convergent
F)	divergent	convergent	divergent
G)	divergent	divergent	convergent
H)	divergent	divergent	divergent

5. Determine whether the following series are convergent or divergent. For full credit be sure to explain your reasoning and tell what test was used.

$$\text{(I)}\sum_{n=1}^{\infty}\frac{n^2}{\left(n^3+1\right)^3} \qquad \text{(II)}\sum_{n=1}^{\infty}\left(\ln 3\right)^{-n} \qquad \text{(III)}\sum_{n=1}^{\infty}\frac{2+\sin\left(n\right)}{\sqrt{n^5}}$$

	(I)	(II)	(III)
A)	convergent	convergent	convergent
B)	convergent	convergent	divergent
C)	convergent	divergent	convergent
D)	convergent	divergent	divergent
E)	divergent	convergent	convergent
F)	divergent	convergent	divergent
G)	divergent	divergent	convergent
H)	divergent	divergent	divergent

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6. Determine whether the following series are absolutely convergent, conditionally convergent, or divergent. For full credit be sure to explain your reasoning and tell what test was used.

$$\text{(I)}\sum_{n=1}^{\infty}\frac{(-1)^n}{n+\ln n} \qquad \text{(II)}\sum_{n=1}^{\infty}\frac{(-1)^{n-1}(n!)^3}{(3n)!} \qquad \text{(III)}\sum_{n=1}^{\infty}\frac{(-e)^n}{(2.71)^n}$$

	(I)	(II)	(III)
A)	conditionally convergent	conditionally convergent	divergent
B)	conditionally convergent	absolutely convergent	divergent
C)	absolutely convergent	conditionally convergent	absolutely convergent
D)	absolutely convergent	divergent	absolutely convergent
E)	divergent	divergent	divergent
F)	divergent	conditionally convergent	absolutely convergent
G)	divergent	conditionally convergent	divergent
H)	divergent	absolutely convergent	divergent

7. Determine whether the following series are absolutely convergent, conditionally convergent, or divergent. For full credit be sure to explain your reasoning.

$$\text{(I)}\sum_{n=1}^{\infty}\left(\frac{\pi}{2}\right)^n \qquad \text{(II)}\sum_{n=1}^{\infty}\frac{(-1)^{n-1}e}{\sqrt{n}} \qquad \text{(III)}\sum_{n=1}^{\infty}\frac{1}{\sqrt{n}\left(\sqrt{n}+1\right)^3}$$

	(I)	(II)	(III)
A)	absolutely convergent	conditionally convergent	divergent
B)	absolutely convergent	absolutely convergent	absolutely convergent
C)	absolutely convergent	conditionally convergent	absolutely convergent
D)	absolutely convergent	divergent	absolutely convergent
E)	divergent	divergent	divergent
F)	divergent	conditionally convergent	absolutely convergent
G)	divergent	conditionally convergent	divergent
H)	divergent	absolutely convergent	absolutely convergent

Answers:

1. D 2. B 3. A 4. C 5. A 6. B 7. F