$$\frac{1}{N^2+h} = \frac{1}{N(n+1)} = \frac{1}{N} - \frac{1}{N+1}$$

MATH 242 - HW8

due: 03/13/2024

1. Sum the series

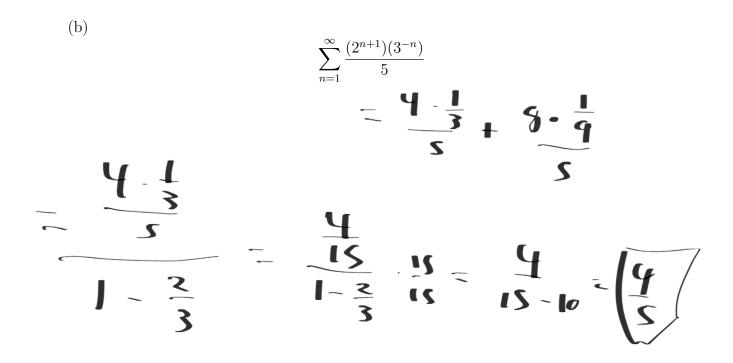
(a)

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

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

$$\frac{1}{1-\frac{1}{6}}$$
 - $\frac{1}{1}$

$$\frac{1-(e-1)}{e-1}=\frac{e-e}{e-1}$$



2. Determine if the integral test for convergence applies (the comparable continuous function f(x) must be continuous, positive, and decreasing for $x \in [1, \infty)$) and then if it does, show either convergence or divergence.

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

3. Find all of the values of x for which the series below converge. Provide you solution in interval notation e.g. $x \in (a, b) \cup (c, d)$:

(a)
$$\sum_{n=0}^{\infty} \frac{2^n}{4x^n}$$

$$\frac{|2|}{x}|2|$$

$$2 (|x|)$$

$$\times (-2) (2|x|)$$

(b)
$$\sum_{n=0}^{\infty} 5 \frac{(x-2)^n}{3^{n+1}}$$

$$\frac{|X-2|}{3}|$$
 $\frac{|X-2|}{3}$
 $\frac{|X-3|}{3}$
 $\frac{|X-3|}{3}$

4. Determine the Convergence/Divergence of the Series using the Direct Comparison Test:

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

5. Determine the Convergence/Divergence of the Series using the Limit Comparison Test:

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