Analysis H 2021-2022 - Hahn / Tanto
Unit 8: Sequences and Series Quiz 2
No Calculators



Why so series? _	Chris	lee	
Period: 3	•		

50 point

#1-5 are Multiple Choice: Circle the best answer. [2 pts each]

1. Which of these is NOT a test for convergence for series?
a) ratio test (b) hth term test (c) geometric series test (c) comparison test
e) none of the above (all the listed answers can be used to test for convergence)
2. Consider the explicit definition: $a_n = (n-5)^2 + 8$. For this definition, the <u>sequence</u> is
a) everywhere increasing b) everywhere decreasing c) increasing only for n > 5
d) decreasing only for n > 5 e) strictly alternating
3. Consider the explicit definition: $a_n = (n-5)^2 + 8$. For this definition, the <u>sequence of partial sums</u> is
a) everywhere increasing b) everywhere decreasing c) increasing only for n > 5
d) decreasing only for $n > 5$ e) strictly alternating 24 , 5
4. Which of the following is a subsequence of $\{n(-1)^{n+1}\}$? (Which of the following sets are entirely contained within the given sequence?)
a) natural numbers b) negative integers c) rational numbers
d) positive odd numbers e) positive even numbers
5. $\sum \frac{1}{n^p}$ will diverge for what values of p?
a) $p > 0$ b) $p \ge 1$ c) $p > 1$ d) $p < 1$
6. A certain sequence $\{a_n\}$ converges to L with a neighborhood of ε . Write "True" or "False" for each. [1 pt each]
a) For all values of n, $L - \varepsilon \le a_n \le L + \varepsilon$
b) There are an infinite number of values for a_n that are inside the neighborhood. \bot
\mathbf{z} c) If a_n is within the neighborhood, then a_{n+1} is also in the neighborhood.

d) There is a value of M such that if $n \ge M$, a_n is within the neighborhood.

- 7. For each <u>sequence</u>, write "C" for converge or "D" for diverge. You don't have to prove them. [1 pts each]
 - a) $a_n = \frac{1}{n}$

- b) $a_n = \frac{1}{n^2}$
- $\oint c) \ a_n = \frac{1}{\sqrt{n}}$
- d) $a_n = \frac{n^n}{n!}$

C

C

1, 1, 1, 1, 1

D

- e) $a_n = \sin n$
- f) $a_n = \frac{1}{(1.2)^n}$
- g) $a_n = \frac{1}{(0.8)^n}$
- h) $a_n = \frac{n+1}{(-1)^n}$

D

6

D

1

- 8. For each infinite series, write "C" for converge or "D" for diverge. You don't have to prove them. [1 pt each]
 - a) $a_n = \frac{1}{n}$

b) $a_n = \frac{1}{n^2}$

c) $a_n = \frac{1}{\sqrt{n}}$

d) $a_n = \frac{n^n}{n!}$

D

C

T)

D

- e) $a_n = \sin n$
- f) $a_n = \frac{1}{(1.2)^n}$
- g) $a_n = \frac{1}{(0.8)^n}$
- h) $a_n = \frac{n+1}{(-1)^n}$

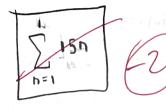
D

C

D

D

9. Write a series that converges to 15. Give your answer in Sigma notation. [4 pts]



Questions 10-12: [5 pts each]

For each series, write a clear proof to show convergence or divergence, first indicating the name of the test you used. **Important: for these 3 problems, you MAY NOT use the same test twice!** If you use the same test for more than one problem, you will lose 3 points per infraction. Do the work for #10 and 11 on this page, and then the work for #12 on the back of this page.

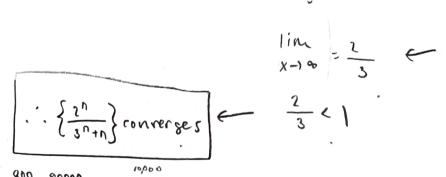
Test used: alternating sprices.

Strictly alt:
$$\cos(n\pi)$$
 can only be 1 or -1.

Abs valve characters:

Inth term goes to 0

 $n+1 \ge n$
 $n+1 \ge n$



3" increases faster so
the "n" on top and
bottom become insignific
since there's a "3"
on both top and
bottom, take ratio

12. $\sum_{n=1}^{\infty} \frac{6+8n+9n^2}{3+2n+n^2} = \frac{23}{6}$ Test used: <u>nth</u> term test (Show your work for this problem on the back of this page)

12.

$$\sum_{n=1}^{\infty} \frac{6+8n+9n^2}{3+2n+n^2}$$

Test used (write it again): nth term test

Let n = 100 for
$$\left\{\frac{6+8n+9n^2}{3+2n+1n^2}\right\} = \frac{90906}{10203}$$

1

in order for series to converse, nth term must approach & but were it approaches 9.

$$\left\{\frac{6+8n+9n^2}{3+2n+n^2}\right\}$$
 diverges