

1. Find $\lim_{x \rightarrow -6} \frac{x^2 + 4x - 12}{x + 6}$.
- 4
 - 0
 - 8
 - $-\infty$
 - ∞
2. Find $\lim_{x \rightarrow 0} (1 - 4x)^{\frac{1}{x}}$.
- ∞
 - 0
 - $e^{\frac{1}{4}}$
 - $-\infty$
 - e^{-4}
3. Evaluate $\int_{-\infty}^0 \frac{3}{2x - 7} dx$.
- converges to 1.5
 - converges to 3
 - converges to 5
 - converges to -7
 - The integral diverges.
4. Evaluate $\int_{-\infty}^{\infty} 8xe^{-2x^2} dx$.
- The integral diverges
 - converges to -0.8
 - converges to 0
 - converges to -1.6
 - converges to 8
5. Determine whether the sequence $\{\frac{\cos^6 n}{2^n}\}$ converges or diverges. If it converges, find the limit.
- converges to 0
 - converges to 1
 - converges to 2
 - converges to $\frac{1}{2}$
 - diverges
6. Determine whether the series $\sum_{n=1}^{\infty} \frac{11}{n(n+2)}$ is convergent or divergent. If it is convergent, find its sum.
- $\frac{3}{44}$
 - $\frac{44}{3}$
 - $\frac{15}{4}$
 - $\frac{33}{4}$
 - divergent
7. Determine whether the series $\sum_{n=1}^{\infty} \frac{1}{4n+2}$ is convergent or divergent.
- The series is divergent by integral test.
 - The series is convergent by integral test.
 - All our tests are inconclusive.
 - The series is convergent by nth term test.
 - The series is convergent by comparison test.
8. Suppose $\sum a_m$ and $\sum c_m$ are series with positive terms and $\sum c_m$ is known to be convergent. What can you say about $\sum a_m$, if $a_m > c_m$ for all m and what can you say about $\sum a_m$, if $a_m < c_m$ for all m ?
- For both cases, $\sum a_m$ is divergent.
 - If $a_m > c_m$ for all m , then $\sum a_m$ is divergent, and if $a_m < c_m$ for all m , then $\sum a_m$ is convergent.
 - For both cases, we cannot say anything about $\sum a_m$.
 - If $a_m > c_m$ for all m , we cannot say anything about $\sum a_m$, and if $a_m < c_m$ for all m , then $\sum a_m$ is convergent.
 - For both cases, $\sum a_m$ is convergent.

9. Determine the convergence of the following series:

$$\sum_{n=0}^{\infty} (-1)^n \frac{6}{n+2}$$

$$\sum_{n=1}^{\infty} (-1)^n \frac{n}{10+n}$$

- a) both converge
- b) both diverge
- c) first series converges and second series diverges
- d) first series diverges and second series converges
- e) all our tests are inconclusive.

10. Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

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

- a) divergent by ratio test
- b) absolutely convergent
- c) divergent by nth term test
- d) conditionally convergent
- e) all our tests are inconclusive

11. Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

$$\sum_{n=1}^{\infty} \frac{\cos 3n}{2^n}$$

- a) absolutely convergent
- b) divergent by comparison test
- c) conditionally convergent
- d) divergent by ratio test
- e) all of our tests are inconclusive

12. Test the series for convergence or divergence.

$$\sum_{n=1}^{\infty} \frac{4^n n^2}{n!}$$

- a) The series is convergent by ratio test.
- b) The series is divergent by ratio test.
- c) The series is divergent by root test.
- d) The series is divergent by comparison test.
- e) Both ratio and root test fail.

For the next 5 problems, determine whether each series is absolutely convergent, conditionally convergent, or divergent. **Code on your scantron sheet A** if the series is *Absolutely convergent*, **C** if it is *Conditionally convergent*, or **D** if it is *Divergent*.

13. (3 pts.) $\sum_{n=2}^{\infty} \frac{(-1)^n}{\ln(n)}$

14. (3 pts.) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} n}{\sqrt{n^2 + 3}}$

15. (3 pts.) $\sum_{n=0}^{\infty} \frac{(-10)^n}{n!}$

16. (3 pts.) $\sum_{n=1}^{\infty} (-1)^{n+1} \left(\frac{5n}{3n+1} \right)^n$

17. (3 pts.) $\sum_{n=1}^{\infty} \frac{(n+2)!}{3^n (n!)^2}$

18. (10 pts.) Determine the convergence or divergence of the improper integral

$$\int_0^{\infty} x e^{-5x} dx.$$

Explain the reason if it diverges and evaluate the integral if it converges.

19. (15 pts.) Determine whether the following sequences converge or diverge. If diverge, explain the reason and if converge, find the limit.

a) $\left\{ \frac{4^n}{3^{n-1}} \right\}$

Converges to _____

Diverges; Reason:

b) $\left\{ \frac{n^2}{e^n} \right\}$

Converges to _____

Diverges; Reason:

c) $\left\{ \frac{1-n^2}{3n^2+2} \right\}$

Converges to _____

Diverges; Reason:

d) $\left\{ \left(\frac{\ln n^2}{n} \right) \right\}$

Converges to _____

Diverges; Reason:

e) $\left\{ \sin \frac{n\pi}{2} \right\}$

Converges to _____

Diverges; Reason:

ITEM NO. FORM: A

1	C
2	E
3	E
4	C
5	A
6	D
7	A
8	D
9	C
10	B
11	A
12	A
13	C
14	D
15	A
16	D
17	A

18. $1/25$

19. a) diverges
b) converges to 0
c) converges to $-1/3$
d) converges to 0
e) diverges