

L'Hop and Improper integrals

Name: _____

Date: _____

1. Determine whether the improper integral $\int_{-\infty}^{-1} x^{-3} dx$ converges or diverges and evaluate the integral if it converges.

- A. converges, 1 B. converges, 3 C. converges, $-\frac{1}{2}$ D. diverges

2. Determine whether the integral $\int_0^{16} \frac{1}{\sqrt{x}} dx$ converges or diverges and evaluate the integral if it converges.

- A. diverges B. converges, $\frac{1}{\sqrt{2}}$ C. converges, 4 D. converges, 8

3. Given: $\int_{-8}^1 \frac{1}{\sqrt[3]{x}} dx$.

Determine whether the integral converges or diverges, and evaluate the integral if it converges.

- A. diverges B. converges, 2 C. converges, 9 D. converges, $-\frac{9}{2}$

4. Determine whether the integral $\int_0^{\infty} \frac{2x}{1+x^2} dx$ converges or diverges and evaluate the integral if it converges.

- A. converges, 2 B. converges, $\frac{1}{2}$ C. converges, $\frac{3}{2}$ D. diverges

5. Determine whether the integral $\int_4^{\infty} \frac{1}{x^2-1} dx$ converges or diverges and evaluate the integral if it converges.

- A. converges, 1 B. converges, $\ln \frac{5}{3}$ C. converges, $\frac{1}{2} \ln \frac{5}{3}$ D. diverges

6. Determine whether the integral $\int_{-\infty}^0 \frac{1}{(x-1)^3} dx$ converges or diverges and evaluate the integral if it converges.

- A. converges, 1 B. converges, 2 C. converges, $-\frac{1}{2}$ D. diverges

7. Determine whether the integral $\int_{-\infty}^0 \frac{1}{(x-2)(x-1)} dx$ converges or diverges and evaluate the integral if it converges.

- A. diverges B. converges, e C. converges, $\ln 2$ D. converges, $\ln 2$

8. Determine whether the integral $\int_0^{\infty} e^{-5x} dx$ converges or diverges and evaluate the integral if it converges.

- A. converges, $\frac{1}{5}$ B. converges, 3 C. converges, $\frac{3}{5}$ D. diverges

9. Determine whether the integral $\int_0^{\infty} \frac{x}{e^x} dx$ converges or diverges and evaluate the integral if it converges.

- A. converges, 1 B. converges, $\ln 2$ C. converges, $\frac{e}{2}$ D. diverges

10. Determine whether the integral $\int_0^1 x \ln x dx$ converges or diverges and evaluate the integral if it converges.
- A. converges, 1 B. converges, $\frac{1}{4}$ C. converges, $-\frac{1}{4}$ D. diverges
11. $\int_0^{\infty} e^{-5x} dx =$
- A. $\frac{2}{3}$ B. $\frac{1}{5}$ C. $\frac{e}{5}$ D. $\frac{4}{e}$
12. $\int_{-\infty}^0 \frac{1}{x^2 - 5x + 4} dx =$
- A. $\frac{\ln 2}{3}$ B. $\frac{2 \ln 5}{3}$ C. $\frac{2 \ln 2}{3}$ D. $\frac{2 \ln 4}{3}$
13. $\int_{-\infty}^0 \frac{1}{x^2 - 8x + 12} dx =$
- A. $4 \ln 3$ B. $\frac{\ln 3}{4}$ C. $\frac{\ln 2}{6}$ D. $\frac{2 \ln 6}{3}$
14. $\lim_{n \rightarrow \infty} \left(1 - \frac{3}{n}\right)^n$ is
- A. $-e$ B. $\frac{1}{e^3}$ C. e^{-3} D. $\frac{3}{e-1}$
15. $\lim_{n \rightarrow \infty} \left(1 + \frac{n}{3}\right)^{\frac{1}{2n}}$ is
- A. 6 B. $e^{\frac{3}{2}}$ C. $e^{\frac{2}{3}}$ D. $e^{1/6}$
16. $\lim_{x \rightarrow 0} \frac{\sin 3x}{x + 3x^2}$ is
- A. $\frac{1}{3}$ B. 3 C. 0
D. undefined
17. $\lim_{n \rightarrow 0} \frac{7^n - 1}{n}$ is
- A. 1 B. $\ln 7$ C. $\log 7$ D. e
18. $\lim_{x \rightarrow \infty} \frac{x^2}{\ln x}$ is
- A. 0 B. 1 C. ∞
D. does not exist

19. $\lim_{x \rightarrow 0} \frac{e^{x^2} - 1}{2x^2}$ is

A. 0

B. $\frac{1}{2}$

C. ∞

D. does not exist

20. $\lim_{x \rightarrow 0} (e^x - 3x)^{1/x}$ is

A. e^2

B. e^0

C. e^{-2}

D. e^3

21. $\lim_{x \rightarrow \frac{\pi}{2}} (\cos x + 1)^{1/x}$ is

A. 1

B. $\frac{1}{e}$

C. e

D. ∞

22. $\lim_{x \rightarrow 0^+} \left(\frac{1}{\sin x} - \frac{1}{x} \right)$ is

A. 1

B. 2

C. 0

D. e

23. $\lim_{x \rightarrow 0^-} (\cos x)^x$ is

A. 1

B. 0

C. e

D. ∞

24. $\lim_{x \rightarrow 4} \frac{\ln(x-3)}{2x-8}$ is

A. ∞

B. $\frac{1}{2}$

C. $\ln 3$

D. $2e$

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1.
Answer: C
2.
Answer: D
3.
Answer: D
4.
Answer: D
5.
Answer: C
6.
Answer: C
7.
Answer: C
8.
Answer: A
9.
Answer: A
10.
Answer: C
11.
Answer: B
12.
Answer: C
13.
Answer: B
14.
Answer: C
15.
Answer: D
16.
Answer: B
17.
Answer: B
18.
Answer: C
19.
Answer: B
20.
Answer: C

21.
Answer: B
22.
Answer: C
23.
Answer: A
24.
Answer: B