BC Calculus
Quiz Practice (optional)

Name: _____
Period: _____

Determine if each integral is improper. If it is rewrite it with appropriate with limits. Do not evaluate.

1. $\int_0^8 x^{-1/3}dx$	2. $\int_{-\infty}^{\infty} \frac{x}{1+x^2}\,dx$	3. $\int_0^3 \frac{1}{x-2}\,dx$

Evaluate the following integrals. Use proper notation on every step. Some may converge and some diverge. Show appropriate work to support your answer.

4. $\int_1^{\infty} \frac{1}{\sqrt{x}}\,dx$	5. $\int_1^{\infty} \frac{1}{x^2}\,dx$
6. $\int_e^{\infty} \frac{1}{x\ln^3 x}\,dx$	7. $\int_0^1 \frac{1}{x^2}\,dx$
8. $\int_{-\infty}^3 \frac{1}{x^2+9}\,dx$	9. $\int_0^{\pi/2} \tan\theta\, d\theta$

Evaluate the following limits:

10. $\lim_{x\to 0^+}(\cot x - \csc x)$	11. $\lim_{x\to 0} x\ln(x)$

12. Multiple Choice:

$\lim_{x\to 0}(1+2x)^{\csc x} =$

(A) 0 (B) 1 (C) 2 (D) e (E) e^2

Sequences and Series:

13. Which of the following sequences converge?

I. $\left\{\frac{5n}{2n-1}\right\}$

II. $\left\{\frac{e^n}{n}\right\}$

III. $\left\{\frac{e^n}{1+e^n}\right\}$

(A) I only (B) II only (C) I and II only (D) I and III only (E) I, II, and III

14. Which of the following series converge?

I. $\sum_{n=1}^{\infty} \frac{n}{n+2}$ II. $\sum_{n=1}^{\infty} 3\left(\frac{6}{7}\right)^n$ III. $\sum_{n=1}^{\infty} \frac{1}{n}$

(A) None
(B) II only
(C) III only
(D) I and II only
(E) I and III only

15. The sum of the infinite geometric series $\frac{3}{2}+\frac{9}{16}+\frac{27}{128}+\frac{81}{1,024}+\ldots$ is

(A) 1.60 (B) 2.35 (C) 2.40 (D) 2.45 (E) 2.50

16. If $\lim_{b\to\infty}\int_1^b \frac{dx}{x^p}$ is finite, then which of the following must be true?

(A) $\sum_{n=1}^{\infty}\frac{1}{n^p}$ converges

(B) $\sum_{n=1}^{\infty}\frac{1}{n^p}$ diverges

(C) $\sum_{n=1}^{\infty}\frac{1}{n^{p-2}}$ converges

(D) $\sum_{n=1}^{\infty}\frac{1}{n^{p-1}}$ converges

(E) $\sum_{n=1}^{\infty}\frac{1}{n^{p+1}}$ diverges

17. Which of the following series are convergent?

I. $1+\frac{1}{2^2}+\frac{1}{3^2}+\ldots+\frac{1}{n^2}+\ldots$

II. $1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{n}+\ldots$

III. $1-\frac{1}{3}+\frac{1}{3^2}-\ldots+\frac{(-1)^{n+1}}{3^{n-1}}+\ldots$

(A) I only (B) III only (C) I and III only (D) II and III only (E) I, II, and III

18. Find the sum of the series.

a) $e-\frac{e^2}{5}+\frac{e^3}{25}-\frac{e^4}{125}+\cdots$

b) $\sum_{n=0}^{\infty}2^{-n}$

c) $\sum_{n=0}^{\infty}\left[\frac{1}{n+1}-\frac{1}{n+2}\right]$

19. Determine if the series converges or diverges. Justify.

a) $\sum_{n=0}^{\infty}(-2)^n$

b) $\sum_{k=0}^{\infty}\frac{k^2}{2k^2+1}$

c) $\frac{1}{1^4}+\frac{1}{2^4}+\frac{1}{3^4}+\ldots$

d) $\frac{1}{2}+\frac{2}{5}+\frac{3}{10}+\frac{4}{17}+\cdots\frac{n}{n^2+1}+\ldots$