

AOS Senior BC Test 7.A

Multiple Choice. Circle the letter of the best answer. Problems with no work may receive no credit! Partial credit may be available in limited instances.

1. Which of the following expressions is equal to $\int_0^2 \frac{17x+4}{3x^2-7x-6} dx$?

(a) $\int_0^2 \frac{2}{x-3} dx + \int_0^2 \frac{5}{3x+2} dx$

(b) $\int_0^2 \frac{5}{x-3} dx + \int_0^2 \frac{2}{3x+2} dx$

(c) $\int_0^2 \frac{4}{x-3} dx + \int_0^2 \frac{17x}{3x+2} dx$

(d) $\int_0^2 \frac{17x}{x-3} dx + \int_0^2 \frac{4}{3x+2} dx$

2. Integrate $\int \frac{x}{2} e^{-3x/4} dx$

(a) $-\frac{3x}{4} e^{-3x/4} + \frac{3}{4} e^{-3x/4} + C$

(b) $-\frac{2x}{3} e^{-3x/4} - \frac{8}{9} e^{-3x/4} + C$

(c) $-\frac{x}{2} e^{-3x/4} + \frac{3}{8} e^{-3x/4} + C$

(d) $\frac{x}{2} e^{-3x/4} - \frac{1}{2} e^{-3x/4} + C$

3. If the series $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{2n+1}$ is approximated by a partial sum of the first 15 terms, which of the

following is the alternating series upper bound on the error $\left| \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{2n+1} - \sum_{n=1}^{15} (-1)^{n+1} \frac{1}{2n+1} \right|$?

(a) $\frac{1}{15}$

(b) $\frac{1}{16}$

(c) $\frac{1}{31}$

(d) $\frac{1}{33}$

4. Which of the following series converge?

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

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

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

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

(e) $\sum_{n=1}^{\infty} \frac{3n^2}{n^4+2n}$

5. Which of the following series converge?

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

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

3. $\sum_{n=1}^{\infty} \left(\frac{e}{\pi}\right)^n$

i. None

ii. ii only

iii. iii only

iv. ii and iii only

6. Which of the following is the fourth-degree Taylor polynomial for $f(x) = \ln x$ about $x = 1$?

(a) $P_4(x) = (x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3 - \frac{1}{4}(x-1)^4$

(b) $P_4(x) = (x-1) - (x-1)^2 + 2(x-1)^3 - 6(x-1)^4$

(c) $P_4(x) = (x-1) + \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3 + \frac{1}{4}(x-1)^4$

(d) $P_4(x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4$

Evaluate the following integrals using the appropriate method

7. $\int \frac{7x - 11}{x^2 + 5x - 4} dx$

8. $\int x^2 \ln x dx$

9. $\int x^3 \cos(2x^4) dx$

10. $\int_0^{\infty} \frac{1}{x^2 + 4} dx$