AOS Senior AP Calculus BC, Spring 2024
AP Test Review, Exam 1

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Student Signature **Class** **Date**

Print Name:

1. Evaluate

$$\int \frac{1}{x^2 - 16x + 80}\, dx =$$

(a) $\dfrac{x}{6} \arctan\left|\dfrac{x-8}{6}\right| + C$

(b) $\dfrac{1}{\ln|x^2 - 16x + 80|} + c$

(c) $2\ln|x - 20| - 4\ln|+4| + C$

(d) $\dfrac{1}{4} \arctan\left(\dfrac{x-8}{4}\right) + C$

(e) $\dfrac{1}{6} \arctan\left(\dfrac{x-8}{6}\right) + C$

2. Using the substitution $u = 2x^2 + 1$, the integral $\displaystyle\int_2^4 2x\left(2x^2+1\right)^3\, dx$ is equal to which of the following?

(a) $\dfrac{1}{2}\displaystyle\int_9^{33} u^3\, du$

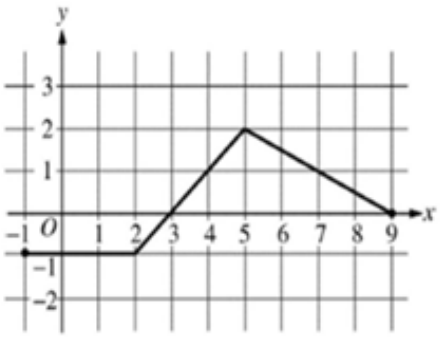
(b) $2\displaystyle\int_9^{33} u^3 du$

(c) $\dfrac{1}{2}\int_9^{33} u^3 du$

(d) $2\displaystyle\int_9^{33} u^3 du$

(e) $\dfrac{1}{4}\displaystyle\int_9^{33} u^3 du$

3. The graph of a piecewise linear function f is given.



Graph of f

What is the value of $\int_1^7 (4f(x) - 1)\ dx$?

(a) 7.5

(b) 9.5

(c) 10

(d) 9

(e) 8

4. Evaluate

$$\lim_{h \to 0} \frac{\sec(3(x+h)) - \sec(3x)}{h}$$

(a) $3\tan^2(3x)$

(b) $3\sec(x)\tan(x)$

(c) $3\sec^2(3x)$

(d) $9\tan^2(3x)$

(e) $3\sec(3x)\tan(3x)$

5. Integrate

$$\int x^3 e^{2x}\ dx$$

(a) $\frac{1}{8}e^{2x}\left(4x^3 - 6x^2 + 6x - 3\right) + C$

(b) $\frac{1}{4}e^{2x}\left(4x^3 - 6x^2 + 6x - 3\right) + C$

(c) $\frac{1}{8}e^{2x}\left(2x^3 - 3x^2 + 6x - 3\right) + C$

(d) $\frac{1}{8}e^{2x}\left(4x^3 + 6x^2 - x + 3\right) + C$

(e) $\frac{1}{4}e^{2x}\left(4x^3 + 6x^2 + 6x + 3\right) + C$

6. Evaluate

$$\int_0^3 \frac{x^2+5x+6}{x+2}dx =$$

(a) $4+2\ln 2$

(b) $\frac{15}{2}+2\ln 2$

(c) $\frac{27}{2}$

(d) $\frac{15}{2}$

(e) $\frac{17}{2}-2\ln 2$

7. Evaluate

$$\int \frac{9x+1}{(2x+1)(x-3)}\,dx$$

(a) $\frac{1}{2}\ln|2x+1|+4\ln|x-3|+C$

(b) $2\ln|2x+1|-4\ln|x-3|+C$

(c) $\ln|2x+1|+\ln|x-3|+C$

(d) $\frac{1}{2}\ln|2x+1|-2\ln|x-3|+C$

(e) $4\ln|2x+1|-2\ln|x-3|+C$

8. The function g is continuous on the closed interval $[2,10]$. If $\int_9^1 g(x)dx = 25$ and $\int_1^5 \frac{g(x)}{2}\,dx = -12$, then $\int_5^9 g(x)\,dx =$

(a) -13

(b) 1

(c) -1

(d) 13

(e) 49

9. Evaluate

$$\int \frac{\cos(\sqrt{x}+1)}{\sqrt{x}}\,dx =$$

(a) $\frac{1}{2}\sin(\sqrt{x}+1)+C$

(b) $\ln|\cos(\sqrt{x}+1)|+C$

(c) $2\sin(\sqrt{x}+1)+C$

(d) $\ln|\sin(\sqrt{x}+1)|+C$

(e) $\cos(\sqrt{x}+1)+C$

10. Evaluate

$$\int_1^\infty xe^{-(x^2-1)}\,dx$$

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

(b) $\frac{1}{2e}$

(c) $\frac{1}{2}$

(d) 2

(e) divergent

11. Let f be the function given by

$$f(x) = \begin{cases} 2x+3b & \text{if } x \le 2 \\ 3ax^2 & \text{if } x > 2 \end{cases}$$

What are all values of a and b for which f is differentiable at $x = 2$?

(a) $a = \frac{-1}{6} \quad b = \frac{1}{3}$

(b) $a = \frac{-1}{6} \quad b = \frac{-2}{3}$

(c) $a = \frac{1}{3} \quad b = \frac{-2}{3}$

(d) $a = \frac{1}{6} \quad b = \frac{-2}{3}$

(e) $a = \frac{1}{6} \quad b = \frac{-1}{3}$

12. Evaluate

$$\lim_{x\to 0} \frac{1-\cos x}{x^2+\sin(4x)} =$$

(a) π

(b) -1

(c) 1

(d) $\frac{\pi}{2}$

(e) 0

13. Evaluate

$$\int \frac{2x}{x^2+9}dx =$$

(a) $\ln(x^2+9)+C$

(b) $\frac{1}{2}\ln(x^2+9)+C$

(c) $\frac{1}{x^2+9}+C$

(d) $\frac{2}{(x^2+9)}+C$

(e) $\frac{x}{3}\arctan\left(\frac{x}{3}\right)+C$

14. If f is the function defined

$$f(x)=\begin{cases} x^2 \text{ for } x<3 \\ \frac{1}{3} \text{ for } x\geq 3 \end{cases}$$

then $\int_{-2}^{4} f(x)dx$ is

(a) 12

(b) $\frac{-28}{3}$

(c) $\frac{28}{3}$

(d) $\frac{20}{3}$

(e) 13

15. If the function f is continuous for all real numbers and if $f(x)=\frac{x^2-25}{x-5}$ when $x\neq 5$, then $f(5)=$

(a) 10

(b) 25

(c) -10

(d) -5

(e) 5

16. Evaluate

$$\lim_{x \to e} \frac{\ln x - 1}{x - e}$$

(a) e

(b) $2e$

(c) $\frac{2}{e}$

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

(e) 1

KEY

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