Name _____ **Group** _____

AP Calculus BC MC Practice Unit 6.9 – 6.13 **NO CALCULATOR**

1. Which of the following is equivalent to $\int \sqrt{x}\left(9x^3 - 2\sqrt{x} + \frac{8}{x}\right)dx$

   A. $\int \sqrt{x}dx \cdot \int \left(9x^3 - 2\sqrt{x} + \frac{8}{x}\right)dx$

   B. $\int \left(9x^{\frac{7}{2}} - 2x + 8x^{-\frac{1}{2}}\right)dx$

   C. $\int \left(9u^6 - 2u + 8u^{-\frac{1}{2}}\right)du$, where $u = \sqrt{x}$

   D. $2\sqrt{x}\int(9u^7 - 2u^2 + 8u^{-1})du$, where $u = \sqrt{x}$

2. Which of the following is an antiderivative of $f(x) = \sqrt{1 + x^3}$

   A. $\int_0^x \sqrt{1+t^3}\,dt$ B. $\int_0^{x^3} \sqrt{1+t}\,dt$ C. $\int_0^{1+x^3} \sqrt{t}\,dt$ D. $\frac{2}{3}\left(1+x^3\right)^{\frac{3}{2}}$

3. $\int \frac{x^3+5}{x^2}dx$

   A. $1 - \frac{10}{x^3} + C$

   B. $\frac{3x}{4} + \frac{15}{x^2} + C$

   C. $\frac{x^2}{2} - \frac{5}{x} + C$

   D. $\frac{x^2}{2} - \frac{5}{3x^3} + C$

4. $\int \frac{12x^2}{2x+1}dx$

   A. $2x^3 \ln|2x + 1| + C$

   B. $4x^3 \ln|2x + 1| + C$

   C. $3x^2 - 3x + \frac{3}{2}\ln|2x + 1| + C$

   D. $3x^2 - 3x + 3\ln|2x + 1| + C$

5. For $x > 0$, $\frac{d}{dx}\left(\int_0^{2x} \ln(t^3 + 1)\right)dt =$

   A. $\ln(x^3 + 1)$

   B. $\ln(8x^3 + 1)$

   C. $2\ln(x^3 + 1)$

   D. $2\ln(8x^3 + 1)$

6. What integral is equivalent to $\int_0^3 \sqrt{5x + 1}\,dx$?

   A. $\frac{1}{5}\int_0^3 \sqrt{u}\,du$ B. $\frac{1}{5}\int_1^{16} \sqrt{u+1}\,du$

   C. $\frac{1}{5}\int_1^{16} \sqrt{u}\,du$ D. $\int_1^{16} \sqrt{u+1}\,du$

7. Evaluate $\int_{\pi}^{2\pi}(sinx + sec^2x)\,dx$

   A. -2 B. 2

   C. 0 D. -1

8. Which expression would you use to find the total area between the curve $y = x^3 - 1$ and the $x-$ axis over the interval $[0,2]$

   A. $\int_0^1 x^3 - 1\,dx + \int_1^2 1 - x^3\,dx$ B. $\int_0^1 1 - x^3\,dx + \int_1^2 x^3 - 1\,dx$

   C. $\int_0^2 x^3 - 1\,dx + \int_0^2 1 - x^3\,dx$ D. $\int_0^2 1 - x^3\,dx + \int_0^2 x^3 - 1\,dx$

9. $\int xf(x)dx =$

   A. $xf(x) - \int xf'(x)dx$ B. $\frac{x^2}{2}f(x) - \int \frac{x^2}{2}f'(x)dx$

   C. $xf(x) - \frac{x^2}{2}f(x) + C$ D. $xf(x) - \int f'(x)dx$

10. What are all values of p for which $\int_1^{\infty} \frac{1}{x^{3p+1}}dx$ converges?

    A. $p < 0$ B. $p > 0$

    C. $p > 1$ D. $p > -\frac{1}{3}$

11. $\int \frac{1}{x^2-7x+10}dx =$

    A. $\ln|(x-2)(x-5)| + C$

    B. $\frac{1}{3}\ln|(x-2)(x-5)| + C$

    C. $\frac{1}{3}\ln\left|\frac{(x-2)}{(x-5)}\right| + C$

    D. $\frac{1}{3}\ln\left|\frac{(x-5)}{(x-2)}\right| + C$

12. $\int_0^5 \sqrt{\frac{5-x}{5}}dx =$

    A. $\frac{2}{3}$

    B. $\frac{10}{3}$

    C. 5

    D. $\frac{50\sqrt{50}}{3}$

13. $\int_1^2 \frac{x^2-x-5}{x+2}dx =$

A. $-\frac{3}{2}+\ln\frac{4}{3}$ B. $-\frac{25}{21}$

C. $\frac{5}{2}+3\ln\frac{3}{4}$ D. $\frac{23}{45}$

14. If $\int_1^x f(t)dt = \frac{20x}{\sqrt{4x^2+21}} - 4$, then $\int_1^\infty f(t)dt$ is

A. 6 B. 1

C. -3 D. -4

15. The table gives values of $f, f', g, and\ g'$ for selected values of x.

x	0	1
$f(x)$	2	4
$f'(x)$	6	–3
$g(x)$	–4	3
$g'(x)$	2	–1

If $\int_0^1 f'(x)g(x)dx = 5$, then $\int_0^1 f(x)g'(x)dx =$

A. -14 B. 7

C. -2 D. 15

16. $\int_1^2 \frac{x^2-x-5}{x+2}dx =$

A $-\frac{3}{2}+\ln\frac{4}{3}$

B $-\frac{25}{21}$

C $\frac{5}{2}+3\ln\frac{3}{4}$

D $\frac{23}{45}$

17. $\int_1^\infty xe^{-x^2}dx$ is

A $-\frac{1}{e}$

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

C $\frac{1}{e}$

D $\frac{2}{e}$

18. $\int_1^2 (9x^2 - 4x + 1) \ln x dx =$

A $4\ln 2 - \frac{19}{2}$

B $18\ln 2 - 7$

C $18\ln 2 - 5$

D $36\ln 2 - 18$

19. $\int \frac{4}{x^2 - 1} dx =$

A $4\ln|x^2 - 1| + C$

B $2\ln\left|\frac{x-1}{x+1}\right| + C$

C $4\sin^{-1}x + C$

D $4\tan^{-1}x + C$

20. 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 $\int_0^2 \frac{17x}{x - 3} dx + \int_0^2 \frac{4}{3x + 2} dx$