AP Calculus BC
Integration Techniques Review #2

Name _____
Per ____ Date _____

1) $\int \frac{x^2+2x-1}{x+4}\,dx$

2) $\int \frac{8x+5}{2x^2+3x+1}\,dx$

3) $\int \frac{2}{x^2+10x+74}\,dx$

4) $\int \frac{2x-9}{x-5}\,dx$

5) $\int \frac{e^x}{1+e^x}\,dx$

6) $\int \frac{e^x}{1+e^{2x}}\,dx$

7) $\int x^2 \sin(2x)\,dx$

8) $\int \frac{\sec^2(\sqrt{x})}{\sqrt{x}}\,dx$

9) $\int e^x \cos(3x)\,dx$

10) $\int x \arctan(x)\,dx$

11) $\int \cos^2(3x)\,dx$

12) $\int \frac{\sin^3(x)}{\sqrt{\cos(x)}}\,dx$

13) $\int \cot(x)\csc^4(x)\,dx$

14) $\int \sec^3(x)\tan^3(x)\,dx$

15) Let $F(x)$ be an antiderivative of $f(x)=\ln(x)$, where $F(1)=3$. Find the equation of $F(x)$.

Practice Multiple Choice Questions

16) $\int_1^e x\ln(x)\,dx =$

[A] $4e-1$ [B] $\frac{1}{4}e^2+1$ [C] $\frac{1}{4}e^2$

[D] $4e^2+1$ [E] $\frac{1}{4}(e^2+1)$

17) $\int_0^1 \frac{5x+8}{x^2+3x+2}\,dx =$

[A] $\ln(8)$ [B] $\ln\left(\frac{27}{2}\right)$ [C] $\ln(18)$

[D] $\ln(288)$ [E] divergent

18) Suppose f' is a continuous function on $[0,2]$, $f(2) = 6$, and $\int_0^2 f(x)\,dx = 4$.
Then the integral $\int_0^2 x\,f'(x)\,dx =$

[A] 4 [B] 6 [C] 8

[D] 10 [E] cannot be determined

19) The area bounded between the graph of $y = x\sin(x)$ and the x-axis on the interval $[0, \pi]$ is

[A] 1 [B] 2π [C] π

[D] $\frac{\pi^2}{2}$ [E] π^2

20) $\int \frac{6}{x^2 + 2x - 8}\,dx$

[A] $\ln|x^2 + 2x - 8| + C$ [B] $6\ln|x^2 + 2x - 8| + C$

[C] $\ln|x + 4| - \ln|x - 2| + C$ [D] $\frac{1}{6}\ln\left|\frac{x-2}{x+4}\right| + C$

[E] $\ln\left|\frac{x-2}{x+4}\right| + C$

21) Let f be a differentiable function such that $\int f(x)\sin(x)\,dx = -f(x)\cos(x) + \int 4x^3\cos(x)\,dx$.
Which of the following could be $f(x)$?

[A] $\cos(x)$ [B] $\sin(x)$ [C] $4x^3$

[D] $-x^4$ [E] x^4

22) The table to the right gives values of f, f', g, and g' for selected values of x. If $\int_0^1 f'(x)\,g(x)dx = 5$, then $\int_0^1 f(x)\,g'(x)dx =$

$\boldsymbol{x}$	0	1
$\boldsymbol{f(x)}$	2	4
$\boldsymbol{f'(x)}$	6	-3
$\boldsymbol{g(x)}$	-4	3
$\boldsymbol{g'(x)}$	2	-1

[A] -14 [B] -13 [C] -2

[D] 7 [E] 15

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$\frac{1}{2}x^2-2x+7\ln|x+4|+C$

2) $\int \frac{8x+5}{2x^2+3x+1}\,dx$

$\ln|2x+1|+3\ln|x+1|+C$

3) $\int \frac{2}{x^2+10x+74}\,dx$

$\frac{2}{7}\arctan\left(\frac{x+5}{7}\right)+C$

4) $\int \frac{2x-9}{x-5}\,dx$

$2x+\ln|x-5|+C$

5) $\int \frac{e^x}{1+e^x}\,dx$

$\ln(1+e^x)+C$

6) $\int \frac{e^x}{1+e^{2x}}\,dx$

$\arctan(e^x)+C$

7) $\int x^2\sin(2x)\,dx$

$-\frac{1}{2}x^2\cos(2x)+\frac{1}{2}x\sin(2x)+\frac{1}{4}\cos(2x)+C$

8) $\int \frac{\sec^2(\sqrt{x})}{\sqrt{x}}\,dx$

$2\tan(\sqrt{x})+C$

9) $\int e^x\cos(3x)\,dx$

$\frac{1}{10}e^x(\cos(3x)+3\sin(3x))+C$

10) $\int x\arctan(x)\,dx$

$\frac{1}{2}x^2\arctan(x)-\frac{1}{2}x+\frac{1}{2}\arctan(x)+C$

11) $\int \cos^2(3x)\,dx$

$\frac{1}{2}x+\frac{1}{12}\sin(6x)+C$

12) $\int \frac{\sin^3(x)}{\sqrt{\cos(x)}}\,dx$

$-\frac{2}{5}\sqrt{\cos(x)}\,(5-\cos^2(x))+C$
or
$-2\sqrt{\cos(x)}\left(1-\frac{1}{5}\cos^2(x)\right)+C$
or
$-2\sqrt{\cos(x)}+\frac{2}{5}(\cos(x))^{5/2}+C$

13) $\int \cot(x)\csc^4(x)\,dx$

$-\frac{1}{2}\cot^2(x)-\frac{1}{4}\cot^4(x)+C$

14) $\int \sec^3(x)\tan^3(x)\,dx$

$\frac{1}{5}\sec^5(x)-\frac{1}{3}\sec^3(x)+C$

15) Let $F(x)$ be an antiderivative of $f(x) = \ln(x)$, where $F(1) = 3$. Find the equation of $F(x)$.

$F(x) = x\ln(x) - x + 4$

Practice Multiple Choice Questions

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