AP Calculus BC
Integration Techniques Review #1

Name _____
Per ____ Date _____

1) $\int x^2 e^{-x} dx$

2) $\int 6x^2 e^{x^3} dx$

3) $\int \frac{4x}{x^2 - 8} dx$

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

5) $\int \frac{x^3 - 5x^2 + 10x - 5}{x - 2} dx$

6) $\int \frac{3x + 16}{x + 4} dx$

7) $\int \frac{5 - x}{2x^2 + x - 1} dx$

8) $\int x^2 \sin\left(\frac{x}{2}\right) dx$

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

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

11) $\int \frac{\ln(3x)}{x} dx$

12) $\int x^3 \ln x\, dx$

13) $\int \frac{\sin^3(x)}{\cos(x)} dx$

14) $\int \sin^2(5x) dx$

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

16) $\int \cot^2(x) \csc^4(x)\, dx$

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

18) $\int \sec^4(x)\, dx$

19) $\int \cot^3(x)\, dx$

20) Suppose $f'(0)$ is defined, $f(0) = 1, f(3) = 4, f'(3) = -2$

Find $\int_0^1 x\, f''(3x)\, dx$

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1) $\int x^2 e^{-x} dx$

$-x^2e^{-x} - 2xe^{-x} - 2e^{-x} + C$
or
$-e^{-x}(x^2 + 2x + 2) + C$

2) $\int 6x^2 e^{x^3} dx$

$2e^{x^3} + C$

3) $\int \frac{4x}{x^2 - 8} dx$

$2\ln|x^2 - 8| + C$

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

$\frac{5}{6}\ln|x - 3| - \frac{5}{6}\ln|x + 3| + C$

5) $\int \frac{x^3 - 5x^2 + 10x - 5}{x - 2} dx$

$\frac{1}{3}x^3 - \frac{3}{2}x^2 + 4x + 3\ln|x - 2| + C$

6) $\int \frac{3x + 16}{x + 4} dx$

$3x + 4\ln|x + 4| + C$

7) $\int \frac{5 - x}{2x^2 + x - 1} dx$

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

8) $\int x^2 \sin\left(\frac{x}{2}\right) dx$

$-2x^2\cos\left(\frac{x}{2}\right) + 8x\sin\left(\frac{x}{2}\right) + 16\cos\left(\frac{x}{2}\right) + C$

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

$\frac{1}{3}x\sin(3x) + \frac{1}{9}\cos(3x) + C$

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

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

11) $\int \frac{\ln(3x)}{x} dx$

$\frac{1}{2}(\ln(3x))^2 + C$

12) $\int x^3 \ln x\, dx$

$\frac{1}{4}x^4\ln x - \frac{1}{16}x^4 + C$

13) $\int \frac{\sin^3(x)}{\cos(x)} dx$

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

14) $\int \sin^2(5x) dx$

$\frac{1}{2}x - \frac{1}{20}\sin(10x) + C$

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

$\frac{1}{3}\sin^3 x - \frac{1}{5}\sin^5 x + C$

16) $\int \cot^2(x)\csc^4(x)\, dx$

$-\frac{1}{3}\cot^3 x - \frac{1}{5}\cot^5 x + C$

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

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

18) $\int \sec^4(x)\,dx$

$\frac{1}{3}\tan^3 x + \tan x + C$

19) $\int \cot^3(x)\,dx$

$-\frac{1}{2}\cot^2 x + \ln|\csc x| + C$

or

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

20) Suppose $f'(0)$ is defined, $f(0) = 1, f(3) = 4, f'(3) = -2$

Find $\int_0^1 x\, f''(3x)\,dx$

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