AP Calculus Indefinite Integrals Test: 2/8 *Study Guide!*

20 questions, 40 minutes, multiple choice, no calculator (Mimics AP test)

- Be able to take antiderivatives of polynomial functions, rational exponents, negative exponents, rational functions (LN rule), basic trig functions, exponential functions, advanced trig functions, reverse chain rule varieties of all of the above; inverse trig functions
- Be able to take an antiderivative that requires a u-substitution
- Given initial conditions, be able to find a specific solution to an indefinite integral (Find C)

$$\int\left(-3x^2 + 5\sqrt[3]{x^2} - \frac{25\sqrt[4]{x}}{4}\right)dx$$

A) $-\frac{17x}{4} + C$ B) $-3x^3 + 5x^{\frac{5}{3}} - \frac{25x^{\frac{5}{4}}}{4} + C$

C) $-x^3 + 3x^{\frac{5}{3}} - 5x^{\frac{5}{4}} + C$ D) $-x^2 + 3x^{\frac{2}{3}} - 5x^{\frac{1}{4}} + C$

$$\int 60x^4 e^{3x^5+4}\,dx$$

A) $4e^{3x^5+4} + C$ B) $\frac{4 \cdot 5^{3x^5+4}}{\ln 5} + C$

C) $5^{3x^5+4} + C$ D) $e^{3x^5+4} + C$

$$\int 18x^2\cos\left(2x^3+3\right)dx$$

A) $3\cos\left(2x^3+3\right) + C$ B) $3\tan\left(2x^3+3\right) + C$

C) $3\sec\left(2x^3+3\right) + C$ D) $3\sin\left(2x^3+3\right) + C$

$$\int \frac{20e^{4x}}{e^{4x}+4}\,dx$$

A) $\frac{5 \cdot 2^{e^{4x}+4}}{\ln 2} + C$ B) $e^{e^{4x}+4} + C$

C) $\ln\left|e^{4x}+4\right| + C$ D) $5\ln\left(e^{4x}+4\right) + C$

$$\int 16x\tan\left(2x^2+1\right)dx$$

A) $4\ln\left|\cos\left(2x^2+1\right)\right| + C$ B) $4\csc\left(2x^2+1\right) + C$

C) $-4\ln\left|\cos\left(2x^2+1\right)\right| + C$ D) $4\sin\left(2x^2+1\right) + C$

$$\int \frac{1}{25+x^2}\,dx$$

A) $\sin^{-1}\frac{x}{2} + C$ B) $\frac{1}{3} \cdot \sec^{-1}\frac{|x|}{3} + C$

C) $\frac{1}{5} \cdot \tan^{-1}\frac{x}{5} + C$ D) $\frac{1}{5} \cdot \sec^{-1}\frac{|x|}{5} + C$

$\int 2x\sqrt{x-4}\,dx$

A) $\frac{3}{7}(x-4)^{\frac{7}{3}} + 3(x-4)^{\frac{4}{3}} + C$ B) $\frac{12}{7}(x-4)^{\frac{7}{3}} + 12(x-4)^{\frac{4}{3}} + C$

C) $\frac{6}{7}(x-4)^{\frac{7}{3}} + 6(x-4)^{\frac{4}{3}} + C$ D) $\frac{4}{5}(x-4)^{\frac{5}{2}} + \frac{16}{3}(x-4)^{\frac{3}{2}} + C$

$\int -\frac{6 \cdot \sec^2 3x}{\tan 3x}\,dx$

A) $\ln\left|\tan 3x\right| + C$ B) $-2\ln\left|\tan 3x\right| + C$

C) $-2e^{\tan 3x} + C$ D) $3^{\tan 3x} + C$

$\int 12x^2\sqrt{x^3-5}\,dx$

A) $2(x^3-5)^{\frac{3}{2}} + C$ B) $\frac{15}{4}(x^3-5)^{\frac{4}{3}} + C$

C) $3(x^3-5)^{\frac{4}{3}} + C$ D) $\frac{8}{3}(x^3-5)^{\frac{3}{2}} + C$

$\int (x^2+1)^2\,dx$

A) $\frac{1}{5}x^5 + \frac{2}{3}x^3 + x + C$ B) $\frac{4}{5}(x^2+1)^5 + C$

C) $\frac{2}{3}(3x^2+1)^6 + C$ D) $x^4 + 2z^2 + x + C$

If $f''(x) = \cos(x) + 3$, which of the following is $f(x)$ given that $f'(0) = 7$ and $f'(0) = 9$?

(A) $f(x) = \sin x + 3x + 7$ (B) $f(x) = -\cos x + \frac{3}{2}x^2 + 7x + 10$ (C) $f(x) = -\cos x + \frac{3}{2}x^2 + 7x + 9$

If $\frac{dy}{dx} = 4x + 2$ and $y(-1) = -1$, then

A) $y = -2x^2 - 3x + 3$ B) $y = -2x^2 - x - 1$

C) $y = 2x^2 + 2x - 1$ D) $y = -x^2 - 2x + 1$

$\int \frac{1}{\sqrt{16-x^2}}\,dx$

A) $\sin^{-1}\frac{x}{3} + C$ B) $\frac{1}{2} \cdot \sec^{-1}\frac{|x|}{2} + C$

C) $\frac{1}{4} \cdot \sec^{-1}\frac{|x|}{4} + C$ D) $\sin^{-1}\frac{x}{4} + C$

$\int \frac{36x^2}{(4x^3+5)^5}\,dx$

A) $-\frac{2}{(4x^3+5)^2} + C$ B) $-\frac{2}{3(4x^3+5)^3} + C$

C) $-\frac{3}{4(4x^3+5)^4} + C$ D) $-\frac{5}{3(4x^3+5)^3} + C$