Name _____ Hour _____

AP Calculus Quiz 6.2 & 6.3 REVIEW ANSWERS

1. Evaluate the following indefinite integrals

$\int (1+x^3)(4-x)dx = 4x - \frac{1}{2}x^2 + x^4 - \frac{1}{5}x^5 + C$

$\int \left(x^{3/2} + \frac{\sqrt{x}}{5} - \frac{4}{x^3} \right) dx = \frac{2}{5}x^{\frac{5}{2}} + \frac{2}{15}x^{\frac{3}{2}} + \frac{2}{x^2} + C$

$\int \frac{\cos^3 x - 8}{\cos^2 x} dx = \sin x - 8\tan x + C$

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

$\int \frac{x^2-4}{\sqrt[3]{x^2}} dx = \frac{3}{7}x^{\frac{7}{3}} - 12x^{\frac{1}{3}} + C$

$\int \frac{2}{1+x^2} + cscx(cscx + cotx)\, dx$

$= 2\tan^{-1}(x) - \cot(x) - \csc(x) + C$

$\int \frac{1}{x^2} + 2x^2 + \frac{3}{\cos^2 x} dx = \frac{-1}{x} + \frac{2}{3}x^3 + 3\tan x + C$

$\int 2e^x + \sqrt{x} \; dx = 2e^x + \frac{2}{3}x^{\frac{3}{2}} + C$

$\int (x^2-6)^2 dx = \frac{1}{5}x^5 - 4x^3 + 36x + C$

2. Evaluate the following indefinite integrals using u-substitution

$\int x\sqrt{1-5x^2} dx = \frac{-1}{15}(1-5x^2)^{\frac{3}{2}} + C$

$\int \frac{x^3}{3x^4-2} dx = \frac{1}{12}\ln|3x^4-2| + C$

$\int \sin 5x \cdot \cos 5x \, dx = \frac{1}{10}\sin^2(5x) + C$

$\int \sin(e^{3x}) \cdot e^{3x} dx = \frac{-1}{3}\cos(e^{3x}) + C$

$\int \frac{x}{(4x^2+1)^3} dx = \frac{-1}{16(4x^2+1)^2} + C$

$\int \frac{\csc\sqrt{x}\cot\sqrt{x}}{\sqrt{x}} dx = -2\csc(\sqrt{x}) + C$

$\int x^3 \sin(x^4+2) dx = \frac{-1}{4}\cos(x^4+2) + C$

$\int \frac{20x^4}{(x^5+1)^2} dx = \frac{-4}{x^5+1} + C$

$\int \frac{e^x}{1+e^x} dx = \ln|1+e^x| + C$

$\int \tan x \; dx = -\ln|\cos x| + C$

$\int \tan(3x)\sec^2(3x) dx = \frac{1}{6}\tan^2(3x) + C$ OR $\frac{1}{6}\sec^2(3x) + C$

3. Evaluate the following indefinite integrals using inverse trig rules or double substitution

$\int \frac{1}{\sqrt{1-4x^2}}\ dx = \frac{1}{2}\sin^{-1}(2x)+C$

$\int \frac{4}{x\sqrt{25x^2-1}}\ dx = 4\sec^{-1}(5x)+C$

$\int \frac{36}{1+16x^2}\ dx = 9\tan^{-1}(4x)+C$

$\int \frac{2x-1}{\sqrt{x+3}}dx = \frac{4}{3}(x+3)^{\frac{3}{2}} - 14(x+3)^{\frac{1}{2}} + C$

$\int x\cdot\sqrt[3]{x+1}\ dx = \frac{3}{7}(x+1)^{\frac{7}{3}} - \frac{3}{4}(x+1)^{\frac{4}{3}} + C$

$\int x^2\sqrt{x-2}\ dx = \frac{2}{7}(x-2)^{\frac{7}{2}} + \frac{8}{5}(x-2)^{\frac{5}{2}} + \frac{8}{3}(x-2)^{\frac{3}{2}} + C$

4. Find the derivative and state a corresponding integration formula.

$\frac{d}{dx}\left[\sqrt{5x^2-3x+1}\right]$

RULE: $\int \frac{10x-3}{2\sqrt{5x^2-3x+1}}\ dx = \sqrt{5x^2-3x+1}+C$

5. Solve the initial value problem.

$\frac{dy}{dx} = sec^2x - sinx, \quad y\left(\frac{\pi}{4}\right) = 1$

ANS: $y = \tan x + \cos x - \frac{\sqrt{2}}{2}$

6. Solve the initial value problem.

$\frac{dy}{dx} = xe^{x^2}, \quad y(0) = 0$

ANS: $y = \frac{1}{2}e^{x^2} - \frac{1}{2}$

7. Find a function f such that $f'(x) = 6 - 5\sin(2x)$ and $f(0) = 3$.

ANS: $y = 6x + \frac{5}{2}\cos 2x + \frac{1}{2}$