Do Now:

Evaluate each

① $\int \frac{2-t^3}{t^3}\,dt$

$\int (2t^{-3}-1)\,dt = 2\cdot\frac{t^{-2}}{-2} - t + C$

$-\frac{1}{t^2} - t + C$

② $\int \frac{1}{\sqrt[3]{x^2}}\,dx$

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

$3\sqrt[3]{x} + C$

③ $\int \left(\frac{1}{t^3} - 2\cos t\right)dt$

$\int (t^{-3} - 2\cos t)\,dt$

$\frac{t^{-2}}{-2} - 2\sin t + C = -\frac{1}{2t^2} - 2\sin t + C$

④ $\int \frac{3x^5+2x^3-x^2}{x^2}\,dx$

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

⑤ $\int (x^2+2)(1-x)\,dx$

$\int (x^2 - x^3 + 2 - 2x)\,dx$

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

⑥ $\int \frac{2x}{1+x^2}\,dx$

$u = 1+x^2$
$du = 2x\,dx$

$\int u^{-1}\,du = \ln|u| + C$
$= \ln|1+x^2| + C$

⑦ $\int \frac{1}{25+x^2}\,dx$

$\frac{1}{25}\int \frac{1}{1+\frac{x^2}{25}}\,dx = \frac{1}{25}\int \frac{1}{1+\left(\frac{x}{5}\right)^2}\,dx$

$u = \frac{x}{5}$
$du = \frac{1}{5}\,dx$
$5\,du = dx$

$\frac{1}{\cancel{25}} \cdot \cancel{5} \int \frac{1}{1+u^2}\,du$

$\frac{1}{5}\arctan u + C$

$\frac{1}{5}\arctan\left(\frac{x}{5}\right) + C$

⑧ $\int \left(1-\cos^2 x \sec x\right)dx$

$\int \left(1 - \cos^{\cancel{2}} x \cdot \frac{1}{\cancel{\cos x}}\right)dx$

$\int (1-\cos x)\,dx = x - \sin x + C$

Homework 02-06

Name: ______________________________________ Date: ____________

AP Calculus AB More Integration Practice Ms. Loughran

$* \; e^{6\ln x} = e^{\ln x^6} = x^6$

1. $\int (e^{6\ln x} + e^{\frac{x}{4}})dx =$

$u = \frac{x}{4}$

$du = \frac{1}{4}dx$

$4du = dx$

$4\int e^u du = 4e^u + C$

$$\int \left(x^6 + e^{\frac{x}{4}}\right)dx = \frac{x^7}{7} + 4e^{\frac{x}{4}} + C$$

2. $\int x\sqrt{5x^2 - 4}\, dx =$

$u = 5x^2 - 4$

$du = 10x\,dx$

$\frac{du}{10} = x\,dx$

$\frac{1}{10}\int u^{\frac{1}{2}} du$

$\frac{1}{\cancel{10}_5} \cdot \frac{\cancel{2}}{3} u^{3/2} + C$

$\frac{1}{15}(5x^2-4)^{3/2} + C$

$* \left[\tan^{-1} x = \frac{1}{x^2+1}\right]$ 3. $\int \frac{dx}{9+x^2} =$

$\int \frac{dx}{9(1+\frac{x^2}{9})}$

$\frac{1}{9}\int \frac{dx}{1+(\frac{x}{3})^2}$

$u = \frac{x}{3}$

$du = \frac{1}{3}dx$

$3du = dx$

$\frac{1}{\cancel{9}_3} \cdot \cancel{3} \int \frac{1}{1+u^2} du$

$\frac{1}{3}\tan^{-1}(u) + C$

$\frac{1}{3}\tan^{-1}\left(\frac{x}{3}\right) + C$

4. $\int x\sqrt{3x}\, dx =$

$\sqrt{3}\int x\sqrt{x}\, dx$

$\sqrt{3}\int x^{3/2} dx$

$\sqrt{3} \cdot \frac{2}{5} x^{\frac{5}{2}} + C$

$\frac{2\sqrt{3}}{5} x^{\frac{5}{2}} + C$

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

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

$\frac{1}{3}\int (x+2+x^{-1})\,dx = \frac{1}{3}\left(\frac{x^2}{2}+2x+\ln|x|\right)+C$

6. $\int \frac{\ln^3 x}{x}dx =$

$* \ (\ln x)^3 = \ln^3 x$

$u = \ln x$

$du = \frac{1}{x}\,dx$

$\int u^3\,du = \frac{u^4}{4}+C = \frac{\ln^4 x}{4}+C$

7. $\int \tan^6 x \sec^2 x\,dx =$

$u = \tan x$

$du = \sec^2 x\,dx$

$\int u^6\,du = \frac{u^7}{7}+C = \frac{\tan^7 x}{7}+C$

8. $\int e^x(e^{3x})\,dx =$

$\int e^{4x}\,dx$

$\frac{1}{4}e^{4x}+C$