7.1 AB Integration Review

ex: Evaluate.

a) $\int \left(x^3+1\right)dx$ $= \frac{x^4}{4} + x + C$

b) $\int \sin\left(2x-3\right)dx$ $-\frac{1}{2}\cos(2x-3)+C$

c) $\int \left(x-7\right)^5 dx$ $= \frac{(x-7)^6}{6} + C$

The Chain Rule Revisited

$$\frac{d}{dx}\left[f\left(g(x)\right)\right] = f'(g(x)) \cdot g'(x)$$

The Chain Rule for Integration

$$\int f'\left(g(x)\right)g'(x)\,dx = f(g(x)) + C$$

ex: Evaluate.

d) $\int x\sqrt{x^2-9}\,dx$ $\frac{2}{3}\cdot\frac{1}{2}(x^2-9)^{3/2}+C$

e) $\int \frac{1}{4x-1}\,dx$ $= \frac{1}{4}\ln|4x-1|+C$

f) $\int \frac{\ln x}{x}\,dx = \int \frac{1}{x}\cdot \ln x\,dx = \frac{(\ln x)^2}{2}+C$

ex: Evaluate.

g) $\int \frac{x^2+x+1}{x^2+1}dx = \int \frac{x^2+1}{x^2+1}dx + \int \frac{x}{x^2+1}dx$

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

h) $\int \frac{1}{e^{3x-8}}dx = \int e^{-3x+8}dx = -\frac{1}{3}e^{-3x+8} + C$

i) $\int 5^x dx = \frac{1}{\ln 5} \cdot 5^x + C$

ex: Evaluate. $\int \frac{du}{a^2+u^2} = \frac{1}{a}\arctan\frac{u}{a} + C$

j) $\int \frac{dx}{9+x^2} = \frac{1}{3}\arctan\frac{x}{3} + C$

k) $\int \frac{dx}{\sqrt{4x-x^2}} = \int \frac{dx}{\sqrt{4-(x-2)^2}} =$

$\arcsin\frac{x-2}{2} + C$

$-(x^2-4x+4)+4$

$4-(x-2)^2$

$$\int \tan^2 x \, dx$$

$$1 + \tan^2 x = \sec^2 x$$

$$\int (\sec^2 x - 1) \, dx$$

$$\tan x - x + C$$