4.4 #45-51 odd; 75-91 odd
4.5 #7-33 odd; 41-53 odd; 57-75 odd
5.2 #1-35 odd; 43-53 odd; 61, 63
5.4 #87-107 odd
5.5 #61-68 all

4.5 #17 $\int 5x\sqrt[3]{1-x^2}\,dx = \int -\frac{5}{2}u^{1/3}\,du$

$u = 1 - x^2$

$\frac{-5}{2}\cdot du = -2x\,dx \cdot \frac{-5}{2}$

$\frac{-5}{2}du = 5x\,dx$

Definite Integrals

66. $\int_{-2}^{4} x^2(x^3+8)^2\,dx$

Let $u = x^3+8$

$du = 3x^2\,dx$

$\frac{1}{3}du = x^2\,dx$

$(-2)^3+8 = 0$

$4^3+8 = 72$

$= \int_0^{72} \frac{1}{3}u^2\,du = \frac{1}{9}u^3\Big|_0^{72}$

$= \int_{x=-2}^{x=4} \frac{1}{3}u^2\,du$

$= \frac{1}{9}u^3\Big|_{x=-2}^{x=4} = \frac{1}{9}(x^3+8)^3\Big|_{-2}^{4}$

$= \frac{1}{9}(4^3+8)^3 - \frac{1}{9}((-2)^3+8)^3$

$= \boxed{41472}$

$$\int \frac{du}{u} = \ln|u| + K$$

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

Recall:

$\frac{d}{dx}(\ln x) = \frac{1}{x}$

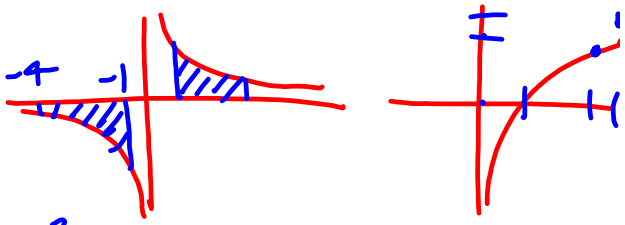
$$\int \frac{f'(x)}{f(x)}\,dx = \ln|f(x)| + K$$

$$\int \tan u\,du = -\ln|\cos u| + K$$

$$\int \cot u\,du = \ln|\sin u| + K$$

$$\int \sec u\,du = \ln|\sec u + \tan u| + K$$

$$\int \csc u\,du = \ln|\csc u - \cot u| + K$$



$\int_1^3 \frac{1}{x}dx = \ln 3 - \ln 1$

$\int_{-4}^{-1} \frac{1}{x}dx = \ln|-1| - \ln|-4|$

$= \ln 1 - \ln 4$

$$\int \tan x\,dx = \int \frac{\sin x}{\cos x}\,dx = \int \frac{-du}{u} = -\ln|u| + C$$

$u = \cos x$

$du = -\sin x\,dx$

$-du = \sin x\,dx$

$= -\ln|\cos x| + C$

5.2

11. $\displaystyle\int \frac{x^2+2x+3}{x^3+3x^2+9x}\,dx = \int \frac{du}{3u} = \frac{1}{3}\ln|u| + C$

$= \boxed{\frac{1}{3}\ln|x^3+3x^2+9x| + C}$

$u = x^3+3x^2+9x$

$du = (3x^2+6x+9)\,dx$

$du = 3(x^2+2x+3)\,dx$

$\frac{1}{3}du = (x^2+2x+3)\,dx$

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

$u = x^2+1$

$du = 2x\,dx$

$\frac{1}{2}du = x\,dx$

$= \int \frac{du}{2u} = \frac{1}{2}\ln|u| + C$

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

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

9. $\int \frac{x^2-4}{x}\,dx = \int \frac{x^2}{x}\,dx - \int \frac{4}{x}\,dx$

$= \int x\,dx - 4\int \frac{1}{x}\,dx$

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

5.2

34. $\int \frac{\csc^2 t}{\cot t}\,dt = \int \frac{-du}{u} = -\ln|u| + c$

$u = \cot t$

$du = -\csc^2 t\,dt$

$-du = \csc^2 t\,dt$

$= -\ln|\cot t| + c$

64. $F(x) = \int_1^{x^2} \frac{1}{t}\,dt$

Find $F'(x)$.

$F'(x) = \frac{1}{x^2} \cdot 2x$

5.4

$$\int e^x dx = e^x + C \qquad [e^x]' = e^x$$

5.5

$$\int a^x dx = \frac{1}{\ln a} \cdot a^x + C \qquad [a^x]' = a^x \cdot \ln a$$

5.4

94. $$\int \frac{e^{1/x^2}}{x^3} dx$$

$u = \frac{1}{x^2} = x^{-2}$

$du = -2x^{-3} dx = \frac{-2dx}{x^3}$

$\frac{-du}{2} = \frac{dx}{x^3}$

$$= \int -\frac{1}{2} e^u du$$

$$= -\frac{1}{2} e^u + C$$

$$= -\frac{1}{2} e^{1/x^2} + C$$