

6.5
9) $\int \frac{2 dx}{x^2+1}$

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

$$\boxed{2 \tan^{-1} x + C}$$

$$x^2 - 4 \overline{\begin{array}{r} 2x^3 + 0x^2 + 0x + 0 \\ -(2x^3 - 8x^2 + 16x) \\ \hline 8x^2 - 16x \end{array}}$$

$$\frac{2x + \frac{8x}{x^2-4}}{8x}$$

7) $\int \frac{2x^3}{x^2-4} dx$

$$\int 2x dx + \int \frac{8x}{x^2-4} dx = \int \left(\frac{A}{x-2} + \frac{B}{x+2} \right) dx = \int \left(\frac{4}{x-2} + \frac{4}{x+2} \right) dx$$

$$\boxed{x^2 + \ln [(x-2)^4 (x+2)^4] + C}$$

$$= 4 \ln |x-2| + 4 \ln |x+2| + C$$

$$\ln (x-2)^4 + \ln (x+2)^4 + C$$

$$A(x+2) + B(x-2) = 8x$$

$$x=2 \quad 4A = 16 \rightarrow A=4$$

$$x=-2 \quad -4B = -16 \rightarrow B=4$$

13) $\int \frac{8x-7}{2x^2-x-3} dx = \int \left(\frac{A}{(2x-3)} + \frac{B}{(x+1)} \right) dx = \int \left(\frac{2}{2x-3} + \frac{3}{x+1} \right) dx$

$$A(x+1) + B(2x-3) = 8x-7 \quad \cancel{2} \cdot \frac{1}{2} \ln |2x-3| + 3 \ln |x+1| + C$$

$$x=-1 \quad -5B = -15 \rightarrow B=3$$

$$x=\frac{3}{2} \quad \frac{5}{2}A = 5 \rightarrow A=2$$

$$\ln |2x-3| + \ln (|x+1|)^3 + C$$

$$\boxed{\ln [(2x-3)(x+1)^3] + C}$$

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$$17) F'(x) = \frac{2}{x^3 - x}$$

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

$$\int F'(x) dx = \int \frac{2}{x^3 - x} dx$$

$x^3 - x$
 $x(x^2 - 1)$

$$\int dF = \int \frac{2}{x^3 - x} dx = \int \left(\frac{A}{x} + \frac{B}{x-1} + \frac{C}{x+1} \right) dx$$

$$F(x) =$$

$$A(x-1)(x+1) + Bx(x+1) + Cx(x-1) = 2$$

$$x=1 \quad 2B = 2 \rightarrow B = 1$$

$$x=-1 \quad 2C = 2 \rightarrow C = 1$$

$$x=0 \quad -A = 2 \rightarrow A = -2$$

$$\int \left(\frac{-2}{x} + \frac{1}{x-1} + \frac{1}{x+1} \right) dx$$

$$-2 \ln|x| + \ln|x-1| + \ln|x+1| + C$$

$$\ln \left| \frac{(x-1)(x+1)}{x^2} \right| + C$$

$$33) y = \frac{M}{1 + Ae^{-mkt}}$$

$$\frac{dP}{dt} = .0015P(150 - P)$$

$$\frac{6A}{6} = \frac{144}{6}$$

$$A = 24$$

$$y = \frac{150}{1 + 24e^{-.225t}}$$

$$100 = \frac{150}{1 + 24e^{-.225t}}$$

$$100 + 2400e^{-.225t} = 150$$

$$\frac{2400e^{-.225t}}{2400} = \frac{50}{2400}$$

$$e^{-.225t} = .0208$$

$$\ln e^{-.225t} = \frac{\ln .0208}{-.225}$$

$$(1+A)6 = \left(\frac{150}{1+A} \right) (1+A)$$

$$6 + 6A = 150$$