

$$(21) \quad \int (x^2 - 1)e^x dx = (x^2 - 1)e^x - 2 \int xe^x dx$$

$$u = (x^2 - 1) \quad v = e^x$$

$$du = 2x dx \quad dv = e^x dx$$

$$-2 \int xe^x dx = -2 \left\{ xe^x - \int e^x dx \right\} = -2xe^x - 2e^x$$

$$u = x \quad v = e^x$$

$$du = dx \quad dv = e^x dx$$

$$\therefore \int (x^2 - 1)e^x dx = (x^2 - 1)e^x - 2xe^x - 2e^x + C = x^2 e^x - e^x - 2xe^x - 2e^x + C$$

$$= x^2 e^x - 2xe^x - e^x + C = e^x (x^2 - 2x - 1) + C = (x - 1)^2 e^x + C$$

$$(23) \quad \int x\sqrt{x-1} dx = \frac{2}{3} x(x-1)^{(3/2)} - \frac{2}{3} \int (x-1)^{(3/2)} dx = \frac{2}{3} x(x-1)^{(3/2)} - \frac{4}{15} (x-1)^{(5/2)} + C$$

$$u = x \quad v = \frac{2}{3} (x-1)^{(3/2)}$$

$$du = dx \quad dv = \sqrt{x-1} dx$$

$$\frac{2}{3} x(x-1)^{(3/2)} - \frac{4}{15} (x-1)^{(5/2)} = \frac{2}{15} [5x(x-1)^{(3/2)} - 2(x-1)^{(5/2)}] = \frac{2}{15} (x-1)^{(3/2)} (5x - 2(x-1))$$

$$= \frac{2}{15} (x-1)^{(3/2)} [3x + 2]$$

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

$$(25) \quad \int x \cos x dx = x \sin x - \int \sin x dx = x \sin x + \cos x + C$$

$$u = x \quad v = \sin x$$

$$du = dx \quad dv = \cos x dx$$

$$(27) \quad \int \arctan x dx = x \arctan x + \int \frac{x}{1+x^2} dx$$

$$u = \arctan x \quad v = x$$

$$du = \frac{1}{1+x^2} dx \quad dv = dx$$

$$\int \frac{x}{1+x^2} dx = \frac{1}{2} \ln|u| + C = \frac{1}{2} \ln|1+x^2| + C = \frac{1}{2} \ln(1+x^2) + C$$

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

$$\therefore \int \arctan x dx = x \arctan x - \frac{1}{2} \ln(1+x^2) + C$$