

Evaluate the following integrals.

$$1. \int (x^5 + 6x^2 + x - 1) dx$$

$$= \frac{1}{6}x^6 + 2x^3 + \frac{1}{2}x^2 - x + C$$

$\int k dx = kx$
 $\int -1 dx = -x$
 $f(x) = -x$
 $f'(x) = -1$

$$2. \int \left(\frac{4}{r}\right) dr$$

$$= 4 \int \frac{1}{r} dr$$

$$= 4 \ln|r| + C$$

$$3. \int (\csc^2 t + 3t^2) dt$$

$$= -\cot t + t^3 + C$$

$$4. \int (8 \cos x) dx$$

$$= 8 \sin x + C$$

$$5. \int \left(\frac{\sqrt{w}-1}{\sqrt{w}}\right) dw = \int \left(\frac{\sqrt{w}}{\sqrt{w}} - \frac{1}{\sqrt{w}}\right) dw$$

$$= \int (1 - w^{-1/2}) dw$$

$$= w - 2w^{1/2} + C$$

$$6. \int (3e^x + 2x^3 + x^{-1}) dx$$

$$= 3e^x + \frac{1}{2}x^4 + \ln|x| + C$$

$$7. \int (x + e^x) dx$$

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

$$8. \int \frac{1}{\sec \theta} d\theta$$

$$= \int \cos \theta d\theta$$

$$= \sin \theta + C$$

$$9. \int \frac{e^{2u}}{e^u} du \rightarrow \int e^{2u-u} du$$

Subtract exponents when dividing

$$= \int e^u du$$

$$= e^u + C$$

$$10. \int \left(\frac{e^{x+2}}{3}\right) dx$$

$$= \frac{1}{3} \int e^x \cdot e^2 dx$$

$$= \frac{1}{3} e^2 \int e^x dx$$

$$= \frac{1}{3} e^2 e^x + C \rightarrow \frac{1}{3} e^{2+x} + C$$

$$11. \int (x^2 - 5 \cos x) dx$$

$$= \frac{1}{3}x^3 - 5 \sin x + C$$

$$12. \int (2 \sec \theta \tan \theta - 3 \sin \theta) d\theta$$

$$= 2 \sec \theta + 3 \cos \theta + C$$