1) $\int x^3 dx = \dfrac{x^4}{4} + C$

2) $\int (3x^2 + 6) dx = \dfrac{3x^3}{3} + 6x + C$

3) $\dfrac{1}{3} \int \sin(3x) dx \, 3 = -\dfrac{1}{3} \cos 3x + C$

4) $\int (2+y^2)^2 dy = \int (4 + 4y^2 + y^4) dy$

$= 4y + 4\dfrac{y^3}{3} + \dfrac{y^5}{5} + C$

5) $\int e^{7t} dt = \frac{1}{7} \int e^{7t} 7 dt = \frac{1}{7} e^{7t} + C$

$\int e^u du = e^u + C$

6) $\int 2x(x^2+1)^{12} dx$

let $u = x^2+1$
$du = 2x\,dx$

$= \frac{(x^2+1)^{13}}{13} + C$

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

8) $\int \sec^2 5x\, dx = \frac{1}{5}\int (\sec^2 5x)\cdot 5\, dx$

$= \frac{1}{5}\tan 5x + C$

9) $\int x^3 e^{x^4}\, dx \qquad$ let $\ v = x^4 \quad dv = 4x^3\, dx$

$= \frac{1}{4}\int e^{x^4}(4x^3\, dx) = \frac{1}{4}e^{x^4} + C$

10) $\int \cos^3(2t) \, \sin 2t \, dt$ let $u = \cos 2t$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad du = -\sin 2t \cdot 2 \, dt$

$-\dfrac{1}{2} \int (\cos 2t)^3 (-2\sin 2t \, dt) = -\dfrac{1}{2} \dfrac{(\cos 2t)^4}{4} + C$

$\int u^n \, du \qquad\qquad = \dfrac{u^{n+1}}{n+1} + C$