1. $\int \left(\frac{1}{\sqrt[3]{x^2}} - \frac{5}{x^3} + \sqrt[5]{x} \right) dx$

$$\int x^{-\frac{2}{3}}\,dx - 5\int x^{-3}\,dx + \int x^{\frac{1}{5}}\,dx = 3x^{\frac{1}{3}} - \frac{5}{-2}x^{-2} + \frac{5}{6}x^{\frac{6}{5}} + c = \mathbf{3\sqrt[3]{x} + \frac{5}{2x^2} + \frac{5}{6}x\sqrt[5]{x} + c}$$

2. $\int \frac{2 + x^2 - x^4}{x^2} dx$

$$\int \left(\frac{2}{x^2} + 1 - x^2 \right) dx = 2\int x^{-2}\,dx + \int 1dx - \int x^2\,dx = \frac{2}{-1}\,x^{-1} + x - \frac{x^3}{3} + c = \mathbf{-\frac{2}{x} + x - \frac{x^3}{3} + c}$$

3. $\int \frac{\sqrt{x} + 4}{x}\,dx$

$$\int \frac{1}{\sqrt{x}}\,dx + 4\int \frac{1}{x}\,dx = \mathbf{2\sqrt{x} + 4\,ln\,|x| + c}$$

4. $\int \frac{x^3 + 6x^2 + 12\,x + 8}{2 + x}\,dx$

$$\int \frac{(x+2)^3}{x+2}\,dx = \int (x+2)^2\,dx = \mathbf{\frac{(x+2)^3}{3} + c}$$

5. $\int \frac{2 - sen^2 x}{\cos^2 x}\,dx$

$$\int \frac{1 + 1 - sen^2 x}{\cos^2 x} dx = \int \frac{1 + \cos^2 x}{\cos^2 x}\,dx = \int \left(\frac{1}{\cos^2 x} + 1 \right) dx = \mathbf{tg\,x + x + c}$$

6. $\int (tg^2 x - ctg^2 x)\,dx$

$$\int (tg^2 x + 1 - ctg^2 x - 1)\,dx = \mathbf{tg\,x + ctg\,x + c}$$

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

$$= \mathbf{e^{x+2} + c}$$

8. $\displaystyle\int \frac{arc\ tg\ x}{1+x^2}\,dx$

$$t = arc\ tgx \qquad dt = \frac{1}{1+x^2}dx \qquad \int t\,dt = \frac{t^2}{2} + c = \frac{(\boldsymbol{arc\ tg\ x})^2}{\mathbf{2}} + \boldsymbol{c}$$

9. $\displaystyle\int \frac{2x^3+1}{\sqrt{x^4+2x}}\,dx$

$$\frac{1}{2}\int \frac{4x^3+2}{\sqrt{x^4+2x}}\,dx = \frac{1}{2}\cdot 2\,(x^4+2x)^{\frac{1}{2}} = \boldsymbol{\sqrt{x^4+2x} + c}$$

10. $\displaystyle\int \frac{2x-1}{4x^2+4}\,dx$

$$\frac{1}{4}\int \frac{2x-1}{x^2+1}\,dx = \frac{1}{4}\int \frac{2x}{x^2+1}\,dx - \frac{1}{4}\int \frac{1}{1+x^2}\,dx = \boldsymbol{\frac{1}{4}\ ln\ (x^2+1) - \frac{1}{4} arc\ tg\ x + c}$$

11. $\displaystyle\int \frac{e^x+1}{e^x+x}\,dx$

$$D(e^x+x) = e^x+1 \qquad = \boldsymbol{\ln\ |e^x+x| + c}$$

12. $\displaystyle\int \frac{1}{\sqrt{x}}2^{\sqrt{x}}\,dx$

$$t = \sqrt{x} \qquad dt = \frac{1}{2\sqrt{x}}dx \qquad 2\int 2^t\,dt = \frac{2}{\ln 2}2^t + c = \boldsymbol{\frac{2}{ln\ 2}2^{\sqrt{x}} + c}$$

13. $\displaystyle\int \frac{1}{x\,(1+\ln^2 x)}\,dx$

$$t = \ln x \qquad dt = \frac{1}{x}dx \qquad \int \frac{1}{1+t^2}\,dt = arc\ tg\ t + c = \boldsymbol{arc\ tg\ ln\ x + c}$$

14. $\displaystyle\int \frac{2x^3+4x+1}{2x+3}\,dx$

$$
\begin{array}{rrrr|l}
2\,x^3 & & 4\,x & +1 & 2x+3 \\
-2\,x^3 & -3\,x^2 & & & x^2-\frac{3}{2}x+\frac{17}{4} \\
\hline
 & -3\,x^2 & 4\,x & +1 & \\
 & +3\,x^2 & +\frac{9}{2}x & & \\
\hline
 & & \frac{17}{2}\,x & +1 & \\
 & & -\frac{17}{2}\,x & -\frac{51}{4} & \\
\hline
 & & & -\frac{47}{4} &
\end{array}
$$

$$\int\left(x^2-\frac{3}{2}x+\frac{17}{4}-\frac{47}{4}\cdot\frac{1}{2x+3}\right)dx=$$

$$=\int x^2\,dx-\frac{3}{2}\int x\,dx+\frac{17}{4}\int 1\,dx-\frac{47}{8}\int\frac{2}{2x+3}\,dx=$$

$$=\boldsymbol{\frac{x^3}{3}-\frac{3}{4}x^2+\frac{17}{4}x-\frac{47}{8}\ln|2x+3|+c}$$

15. $\displaystyle\int \frac{x+4}{4x^2+12x+9}\,dx$

$$\frac{1}{2}\int\frac{2x+8}{(2x+3)^2}\,dx=\frac{1}{2}\int\left(\frac{2x+3}{(2x+3)^2}+\frac{5}{(2x+3)^2}\right)dx=$$

$$=\frac{1}{4}\int\frac{2}{2x+3}\,dx+\frac{5}{4}\int\frac{2}{(2x+3)^2}\,dx=\boldsymbol{\frac{1}{4}\ln|2x+3|-\frac{5}{4\,(2x+3)}+c}$$

16. $\displaystyle\int \frac{2x}{x^2+2x+2}\,dx$

$$\int\frac{2x+2-2}{x^2+2x+2}\,dx=\int\left(\frac{2x+2}{x^2+2x+2}-\frac{2}{(x+1)^2+1}\right)dx=\boldsymbol{\ln\,(x^2+2x+2)-2\,arc\,tg\,(x+1)+c}$$

17. $\displaystyle\int \frac{dx}{e^x+e^{-x}}$

$$\int\frac{dx}{e^x+\frac{1}{e^x}}=\int\frac{e^x}{1+e^{2x}}\,dx=\boldsymbol{arc\,tg\,e^x+c}$$

18. $\displaystyle\int \frac{x^3}{e^{x^2}}\,dx$

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

$f(x)=x^2 \qquad f'(x)=2x$

$g'(x)=2x\,e^{-x^2} \qquad g(x)=-e^{-x^2}$

$$=-\frac{1}{2}\,x^2e^{-x^2}+\int x\,e^{-x^2}\,dx=-\frac{1}{2}\,x^2e^{-x^2}-\frac{1}{2}e^{-x^2}+c=\boldsymbol{-\frac{x^2+1}{2\,e^{x^2}}+c}$$