1 | $\int \frac{\sqrt{x-1}}{x} dx$

Let $u = \sqrt{x-1}$, $du = \frac{1}{2\sqrt{x-1}} dx$

$$\begin{aligned}
\int \frac{\sqrt{x-1}}{x} dx &= \int \frac{u}{u^2+1} 2u du \\
&= 2\int \frac{(u^2+1)-1}{u^2+1} du \\
&= 2\int \frac{\cancel{u^2+1}}{\cancel{u^2+1}} + \frac{-1}{u^2+1} du \\
&= 2\int 1 - \frac{1}{u^2+1} du \\
&= 2\int 1 - \tan^- u du \\
&= 2u - \int \tan^- u du \\
&= 2u - \int \tan^- u du
\end{aligned}$$

2 | **2**

3 | **3**

4 | **4**

5 | **5**

6 | $\int \tan^2 x + 1 dx$

$$\begin{aligned}
\int \tan^2 x + 1 dx &= \int \sec^2 x - 1 + 1 dx \\
&= \int \sec^2 x dx \\
\text{Let} u = x, du = 1& \\
&= \int \sec^2 u du \\
&= \tan u + C \\
&= \boxed{\tan x + C}
\end{aligned}$$

7 | **7**

8 | **8**

9 | $\int \frac{\sec^2 x}{\csc x} sinxdx$

$$\begin{aligned}\int \frac{\sec^2 x}{\csc x} sinxdx &= \int \tan^2 xdx \\ &= \int \sec^2 x - 1dx \\ &= \int \sec^2 xdx - \int 1dx \\ &= \tan x - x\end{aligned}$$

10 | **10**

11 | **TODO** $\int \frac{e^{2\ln\sin x}+e^{2\ln\cos x}}{e^{2\ln\tan x}+e^{2\ln 1}}dx$

$$\begin{aligned}\int \frac{e^{2\ln\sin x}+e^{2\ln\cos x}}{e^{2\ln\tan x}+e^{2\ln 1}}dx &= \int \frac{\sin^2 x+\cos^2 x}{\tan^2 x+1}dx \\ &= \int \frac{1}{\tan^2 x+1}dx \\ &= \int \frac{1}{\sec^2 x}dx \\ &= \int \cos^2 xdx\end{aligned}$$

12 | **12**

13 | **13**

14 | **14**