$$\int_0^{\frac{\pi}{2}} 2\sin\left(\frac{x}{2}\right)\cos\left(\frac{x}{2}\right)\,dx$$

$$2\sin(x)\cos(x) = \sin(2x)$$

$$2\sin\left(\frac{1}{2}x\right)\cos\left(\frac{1}{2}x\right) = \sin\left(\frac{2}{2}x\right)$$

$$= -\cos(x)\Big|_0^{\frac{\pi}{2}} \qquad = \int_0^{\frac{\pi}{2}} \sin(x)\,dx$$

$$\Rightarrow \underbrace{-\cos\left(\frac{\pi}{2}\right)}_{-0} - \underbrace{\left(-\cos 0\right)}_{1} \qquad = \underline{\underline{1}}$$

$$-0 - (-1)$$

$$\int_{-1}^{1} \frac{2}{1+x^2}\,dx \qquad \int_{-1}^{1} 2\cdot\frac{1}{1+x^2}\,dx \qquad *\arctan(1) = \frac{\pi}{4}$$

$$2\int_{-1}^{1}\underbrace{\frac{1}{1+x^2}\,dx}_{\arctan(x)} \qquad = \qquad 2\arctan(x)\Big|_{-1}^{1}$$

$$2\arctan(1) - 2\arctan(-1)$$

$$= \underline{\underline{\pi}} \qquad\qquad 2\frac{\pi}{4} + 2\frac{\pi}{4} = \frac{\pi}{2} + \frac{\pi}{2}$$

$$\int_2^3 \frac{x^2-5x+4}{x-4} \qquad \int_2^3 \frac{(x-4)(x-1)}{x-4} = \int_2^3 x-1\,dx$$

$$\frac{x^2}{2}-x\Big|_2^3 \qquad \left(\frac{9}{2}-3 = \frac{3}{2}\right) - (0)$$

$$= \underline{\underline{\frac{3}{2}}}$$

$$\int_0^{\frac{1}{\sqrt{\ln(41)}}} \ln(41^x)\, dx$$

$$* \quad \ln a^b = b \ln a$$

$$\overset{\text{constant}}{= \int x \ln(41)\, dx}$$

$$\Rightarrow \ln(41) \int x\, dx$$

$$\ln(41) \left. \frac{x^2}{2} \right|_0^{\sqrt{\ln 41}}$$

$$\frac{1}{(\sqrt{\ln 41})^2}$$

$$\ln 41 \cdot \frac{1}{2} \cdot (\sqrt{\ln 41})$$

$$= \ln 41 \frac{1}{\ln 41} \cdot \frac{1}{2} = \frac{1}{2}$$

$$\frac{1}{2} - 0 = \frac{1}{2}$$