

1.

Determine as seguintes integrais:

1)

$$\begin{aligned}& \int_0^{\sqrt{\frac{\pi}{2}}} x \sin x^2 dx \\&= \frac{1}{2} \int_0^{\sqrt{\frac{\pi}{2}}} 2x \sin x^2 dx \\&= \frac{1}{2} (-\cos x^2) \Big|_0^{\sqrt{\frac{\pi}{2}}} \\&= \frac{1}{2} (-\cos (\sqrt{\frac{\pi}{2}})^2 + \cos 0) \\&= \frac{1}{2}\end{aligned}$$

2)

$$\begin{aligned}& \int_0^{\pi} (x+2) \cos x dx \\& f' = \cos x \quad f = \sin x \\& g = x+2 \quad g' = 1 \\& (x+2) \sin x \Big|_0^{\pi} - \int_0^{\pi} \sin x dx \\& (\pi+2) \sin \pi - 2 \sin 0 + \cos x \Big|_0^{\pi} \\&= -2\end{aligned}$$

3)

$$\begin{aligned}& \int_1^2 x 2^x dx \\& f' = 2^x \quad f = \frac{2^x}{\ln 2} \\& g = x \quad g' = 1 \\& \frac{2^x}{\ln 2} x \Big|_1^2 - \int_1^2 \frac{2^x}{\ln 2} \\&= \frac{8}{\ln 2} - \frac{2}{\ln 2} - \frac{1}{\ln 2} \frac{2^x}{\ln 2} \Big|_1^2\end{aligned}$$

$$\begin{aligned}
&= \frac{6}{\ln 2} - \frac{2}{\ln^2 2} \\
&= \frac{6 \ln 2 - 2}{\ln^2 2}
\end{aligned}$$

4)

$$\begin{aligned}
&\int_0^1 \frac{e^x}{\sqrt{e^x + 1}} dx \\
&2(e^x + 1)^{\frac{1}{2}} \Big|_0^1 \\
&2((e + 1)^{\frac{1}{2}} - (2)^{\frac{1}{2}})
\end{aligned}$$

2.

a)

Calcule  $\int_0^{\frac{\pi}{2}} e^x \sin x dx$ :

$$\begin{aligned}
&\int_0^{\frac{\pi}{2}} e^x \sin x dx \\
&\begin{aligned} f' &= \sin x & f &= -\cos x \\ g &= e^x & g' &= e^x \end{aligned} \\
&= \int_0^{\frac{\pi}{2}} e^x \sin x dx = -\cos x e^x \Big|_0^{\frac{\pi}{2}} - \int_0^{\frac{\pi}{2}} -\cos x e^x dx \\
&\begin{aligned} f' &= \cos x & f &= \sin x \\ g &= e^x & g' &= e^x \end{aligned} \\
&= \int_0^{\frac{\pi}{2}} e^x \sin x dx = 1 - \int_0^{\frac{\pi}{2}}
\end{aligned}$$