1.

Determine as seguintes integrais:

1)

$$\int_0^{\sqrt{\frac{\pi}{2}}} x \sin x^2 dx$$

$$= \frac{1}{2} \int_0^{\sqrt{\frac{\pi}{2}}} 2x \sin x^2 dx$$

$$= \frac{1}{2}(-\cos x^2)\Big|_0^{\frac{\pi}{2}}$$

$$= \frac{1}{2}(-\cos(\sqrt{\frac{\pi}{2}})^2 + \cos 0)$$

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

2)

$$\int_0^{\pi} (x+2) \cos x dx$$

$$f' = \cos x \qquad f = \sin x$$

$$g = x + 2 \qquad g' = 1$$

$$(x+2) \sin x\Big|_0^{\pi} - \int_0^{\pi} \sin x dx$$

$$(\pi + 2) \sin \pi - 2 \sin 0 + \cos x\Big|_0^{\pi}$$

$$= -2$$

3)

$$\int_1^2 x 2^x dx$$

$$f' = 2^x \qquad f = \frac{2^x}{\ln 2}$$

$$g = x \qquad g' = 1$$

$$\frac{2^x}{\ln 2} x\Big|_1^2 - \int_1^2 \frac{2^x}{\ln 2}$$

$$= \frac{8}{\ln 2} - \frac{2}{\ln 2} - \frac{1}{\ln 2} \frac{2^x}{\ln 2}\Big|_1^2$$

$$= \frac{6}{\ln 2} - \frac{2}{\ln^2 2}$$
$$= \frac{6\ln 2 - 2}{\ln^2 2}$$

4)

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

2.

a)

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

$$\int_0^{\frac{\pi}{2}} e^x sin(x)dx$$
$$f' = \sin(x) \qquad f = -\cos(x)$$
$$g = e^x \qquad g' = e^x$$
$$= \int_0^{\frac{\pi}{2}} e^x \sin(x)dx = -\cos(x)e^x\Big|_0^{\frac{\pi}{2}} - \int_0^{\frac{\pi}{2}} -\cos(x)e^x dx$$
$$f' = \cos(x) \qquad f = \sin(x)$$
$$g = e^x \qquad g' = e^x$$
$$= \int_0^{\frac{\pi}{2}} e^x \sin(x)dx = 1 + e^{\frac{\pi}{2}} - \int_0^{\frac{\pi}{2}} \sin(x)e^x dx$$
$$= \int_0^{\frac{\pi}{2}} e^x \sin(x)dx = \frac{1}{2}(1 + e^{\frac{\pi}{2}})$$