

14pts

4pts. (1) Let

$$f(x) = \int_0^{\sqrt{x}} t^3 dt.$$

Find $f'(x)$.

$$f'(x) = (\sqrt{x})^3 \cdot \frac{1}{2} \cdot x^{-1/2}$$

either 2pts either 2pts

or

$$f'(x) = (\sqrt{x})^3 \cdot \frac{1}{2\sqrt{x}}$$

6pts (2) Compute the following indefinite integral:

$$f(x) = \int \frac{e^x}{e^x + 1} dx.$$

$$u = e^x + 1$$

$$du = e^x dx$$

$$f(x) = \int \frac{1}{u} du = \ln|u| + C = \ln|e^x + 1| + C$$

OK with or without absolute value

Constant 1pt

Any useful and correctly applied substitution 2pts

one correct antiderivative 2pts

Antiderivative in terms of variable x 1pt

4pts (3) Evaluate the following definite integral:

$$\int_0^{\ln(3)} \frac{e^x}{e^x + 1} dx = \ln|e^x + 1| \Big|_0^{\ln(3)} = \ln|e^{\ln(3)} + 1| - \ln|e^0 + 1| = \ln 4 - \ln 2 = \ln 2$$

up to here 2pts/4pts

up to here 3pts/4pts

up to here 4pts/4pts