Answer on Question #76388 – Math – Calculus

Question

Revenue flow into a fund at a rate of $f(x) = 8000x$ and x denote time in years. If the money flows into the fund over 4 years period is compounded continuously at the rate of 10%, find present and future value.

Solution

Future value:

$$M = \int_0^4 f(x)e^{r(4-x)}dx = \int_0^4 8000xe^{0.1(4-x)}dx = 8000\left(\left(-\frac{xe^{0.1(4-x)}}{0.1}\right)\Big|_0^4 + \int_0^4 \frac{e^{0.1(4-x)}}{0.1}dx\right) =$$

$$= 8000\left(-\frac{4}{0.1} - \frac{e^{0.1(4-x)}}{0.01}\Big|_0^4\right) = 8000\left(-40 - 100 + \frac{e^{0.4}}{0.01}\right) = 73459.76$$

Present value:

$$N = \int_0^4 f(x)e^{-rx}dx = \int_0^4 8000xe^{-0.1x}dx = 8000\left(\left(-\frac{xe^{-0.1x}}{0.1}\right)\Big|_0^4 + \int_0^4 \frac{e^{-0.1x}}{0.1}dx\right) =$$

$$= 8000\left(-40e^{-0.4} - \frac{e^{-0.1x}}{0.01}\Big|_0^4\right) = 8000(-40e^{-0.4} - 100e^{-0.4} + 100) = 49241.55$$

Answer: 73459.76; 49241.55.