

## Question

The rate at which an office building consumes energy (in kilowatt-hours(KWh) per week) is approximated by  $f(t) = 31.461e^{0.7512t}$ , where  $t$  is in weeks since February 3, 2020. Energy consumption costs 18 cents per kilowatt-hour.

Use three digit accuracy in all computations.

Select each of the true statements from the following:

## Answerlist

- The rate at which energy is consumed 2 weeks after February 3, 2020 is  $f(3)$ .
- The rate at which energy is consumed 4 weeks after February 3, 2020 is  $f(31.461)$ .
- The total amount of energy used by the office building during the 3 weeks after February 3, 2020 is  $\int_0^3 f(t)dt$ .
- An antiderivative of  $f(t) = 31.461e^{0.7512t}$  is  $F(t) = 41.881e^{0.7512t}$
- $\int_0^3 f(t)dt = 31.461e^{0.7512(3)} - 31.461e^{0.7512(0)}$
- The total amount of energy used by the office building during the 4 weeks after February 3, 2020 is 845.25 KWh.
- The energy cost for the office building during the 3 weeks after February 3, 2020 is \$64.24.
- All of the above statements are false.

## Solution

### Answerlist

- False. The rate at which energy is consumed 2 weeks after February 3, 2020 is  $f(2) = 141.337$  KWh per week.
- False. The rate at which energy is consumed 4 weeks after February 3, 2020 is  $f(4) = 634.952$  KWh per week.
- True. The total amount of energy used by the office building during the 3 weeks after February 3, 2020 is

$$\int_0^3 31.461e^{0.7512t} dt = \frac{31.461}{0.7512} e^{0.7512(3)} - \frac{31.461}{0.7512} e^{0.7512(0)} = 356.908$$

- True. An antiderivative of  $f(t) = 31.461e^{0.7512t}$  is  $F(t) = \frac{31.461}{0.7512} e^{0.7512t} = 41.881e^{0.7512t}$
- False.

$$\int_0^3 f(t)dt = \int_0^3 31.461e^{0.7512t} dt = \frac{31.461}{0.7512} e^{0.7512(3)} - \frac{31.461}{0.7512} e^{0.7512(0)}$$

- False. The total amount of energy used by the office building during the 4 weeks after February 3, 2020 is

$$\int_0^4 31.461e^{0.7512t} dt = \frac{31.461}{0.7512} e^{0.7512(4)} - \frac{31.461}{0.7512} e^{0.7512(0)} = 803.369 \text{ KWh}$$

- True. The total amount of energy used by the office building during the 3 weeks after February 3, 2020 is

$$\int_0^3 31.461e^{0.7512t} dt = \frac{31.461}{0.7512} e^{0.7512(3)} - \frac{31.461}{0.7512} e^{0.7512(0)} = 356.908 \text{ KWh}$$

To find the energy cost during this period of time we simply multiply this total amount of energy by 0.18 dollars per KWh to get \$64.24

- False.

## Meta-information

extype: mchoice exsolution: 00110010 exname: FTC