7. [14 points] The rate at which a coal plant releases CO_2 into the atmosphere t days after 12:00 am on Jan 1, 2010 is given by the function $E(t)$ measured in tons per day. Suppose $\int_0^{31} E(t)dt = 223$.

a. [4 points] Give a practical interpretation of $\int_{31}^{59} E(t)dt$.

Solution: $\int_{31}^{59} E(t)dt$ is the amount of CO_2 the plant releases into the atmosphere in February.

b. [4 points] Give a practical interpretation of $E(15) = 7.1$.

Solution: Since $t = 15$ corresponds to 12am on January 16th, the statement $E(15) = 7.1$ can be interpreted as
"On January 16th (or 15th) the plant releases approximately 7.1 tons of CO_2 into the atmosphere."

c. [2 points] The plant is upgrading to "clean coal" technology which will cause its July 2010 CO_2 emissions to be one fourth of its January 2010 CO_2 emissions. How much CO_2 will the coal plant release into the atmosphere in July?

Solution: Given in the problem is $\int_0^{31} E(t)dt = 223$ which means the plant released 223 tons of CO_2 into the atmosphere in January. This means that the plant will release 223/4 tons in July.

d. [4 points] Using a left-hand sum with four subdivisions, write an expression which approximates $\int_{31}^{59} E(t)dt$.

Solution: The length of the interval is 28, so with 4 subdivisions $\Delta t = 7$. This means our left hand sum is

$$\int_{31}^{59} E(t)dt \approx 7(E(31) + E(38) + E(45) + E(52)).$$