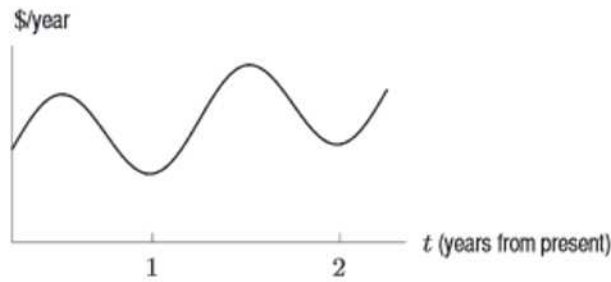


## Section 6.5

1.



The graph reaches a peak each summer, and a trough each winter. The graph shows sunscreen sales increasing from cycle to cycle. This gradual increase may be due in part to inflation and to population growth.

5. (a) Future value =  $12,000e^{0.05(6)} \approx \$16,198.31$

(b) Future value =  $e^{0.05(6)} \int_0^6 1000e^{-0.05t} dt \approx \$13,994.35$

(c) The lump sum in (a) is larger than from (b).

7. (a)  $e^{0.06(30)} \int_0^{30} 1000e^{-0.06t} dt \approx \$84,160.82$

(b)  $1,000(30) = \$30,000$ .

(c)  $84,160.82 - 30,000 = \$54,160.82$ .

9. (a) (i) If the interest rate is 3%, we have

$$\text{Present value} = \int_0^4 5000e^{-0.03t} dt = \$18,846.59.$$

(ii) If the interest rate is 10%, we have

$$\text{Present value} = \int_0^4 5000e^{-0.10t} dt = \$16,484.00.$$

(b) At the end of the four-year period, if the interest rate is 3%,

$$\text{Value} = 18,846.59e^{0.03(4)} = \$21,249.47.$$

At 10%,

$$\text{Value} = 16,484.00e^{0.10(4)} = \$24,591.24.$$

13. (a) The future value in 10 years is \$100,000. We first find the present value,  $P$ :

$$100000 = Pe^{0.10(10)}$$
$$P = \$36,787.94$$

We solve for the income stream  $S$ :

$$36,787.94 = \int_0^{10} Se^{-0.10t} dt$$
$$36,787.94 = S \int_0^{10} e^{-0.10t} dt$$
$$36,787.94 = S(6.321)$$
$$S = \$5820.00 \text{ per year.}$$

The income stream required is about \$5820 per year (or about \$112 per week).

- (b) The present value is \$36,787.94. This is the amount that would have to be deposited now.

15. We compute the present value of the company's earnings over the next 8 years:

$$\text{Present value of earnings} = \int_0^8 50,000e^{-0.07t} dt = \$306,279.24.$$

If you buy the rights to the earnings of the company for \$350,000, you expect that the earnings will be worth more than \$350,000. Since the present value of the earnings is less than this amount, you should not buy.

17. (a) Since the income stream is \$7.5 billion per year and the interest rate is 8.5%,

$$\text{Present value} = \int_0^1 7.5e^{-0.085t} dt$$
$$= 7.19 \text{ billion dollars.}$$

The present value of Intel's profits over the one-year time period is about 7.19 billion dollars.

- (b) The value at the end of the year is  $7.19e^{0.085(1)} = 7.83$ , or about 7.83 billion dollars.