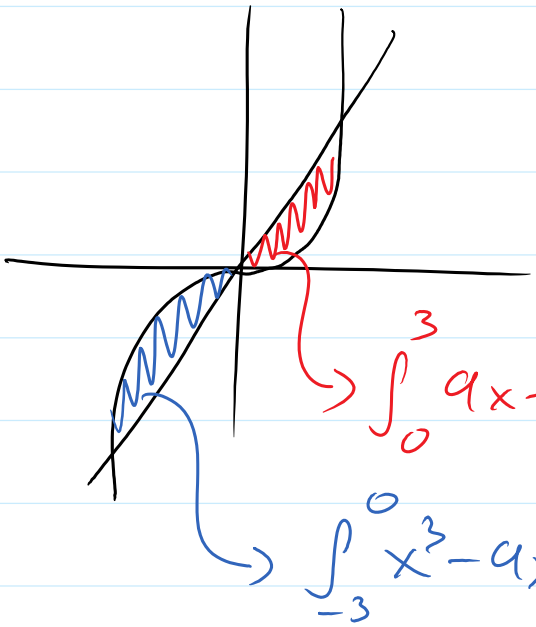
11/17

Friday, November 17, 2017 12:08 PM

Online office hour on Sunday at 6PM



$$9x = x^3$$
$$0 = x^3 - 9x$$
$$0 = x(x^2 - 9)$$
$$= x(x-3)(x+3)$$

$$\int_0^3 9x - x^3\,dx$$

$$\int_{-3}^0 x^3 - 9x\,dx$$

Section 5.5

Ex: Suppose that when it is t years old a particular machine generates at the rate $R'(t) = 6025 - 8t^2$ dollars per year. The operating cost and maintenance accumulates at the rate $C'(t) = 4681 + 13t^2$ dollars per year.

a) The usefull life of a machine is the number of years T before the profit it generates starts to decline. What is the useful life of this machine?

$$P'(t) = 0$$

$$R'(t) - C'(t) = 0$$

$$\underline{R'(t) = C'(t)}$$

$$6025 - 8t^2 = 4681 + 13t^2$$

$$\frac{1344}{21} = \frac{21t^2}{21}$$

$$t^2 = 64 \rightarrow t = 8, \cancel{-8}$$

$$\boxed{T = 8 \text{ years}}$$

b) Compute the net profit generated during the useful life of this machine.

$$\int_0^8 P'(t)\,dt = \int_0^8 1344 - 21t^2\,dt$$

$$= 21\int_0^8 64 - t^2\,dt = 21\left(64t - \frac{1}{3}t^3\Big|_0^8\right.$$

$$= 21\left[64 \cdot 8 - \frac{1}{3}\cdot 8^3 - 0\right] = \boxed{7168}$$

On the exams: T

- $FV = e^{rT}\int_0^T f(t)\,e^{-rt}\,dt$

- $FV = e^{rT} \int_0^T f(t)\, e^{-rt}\, dt$
- useful life: $R'(t) = C'(t)$