3.7 Optimization Problems

Juan J. Moreno Santos

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1. Indefinite integral

$$\int(-8t+7)dt \tag{1}$$
$$= -4t^2 + 7t + C \tag{2}$$

2. Indefinite integral

$$\int 10\sin s + 7\cos s ds \tag{3}$$
$$= -10\cos s + 7\sin s ds \tag{4}$$
$$\tag{5}$$

3. Differential equation

$$\frac{dy}{dx} = 12x^3,\ y(1) = -2 \tag{1}$$
$$\int dy = \int 12x^3 dx \tag{2}$$
$$y(x) = 3x^4 + C \tag{3}$$

4. Automobile Problem. Hint:

$$\frac{86km/h - 30km/h}{12s} = \frac{km}{hr \cdot sec} = \frac{m}{s^2}$$

$$\frac{85km/h - 30km/h}{12s} = \tag{1}$$

$$\lim_{|\Delta x|\to 0}\sum_{i=1}^{n} 4c_i(7-c_i)^2\Delta x_i,\ [0,8] \tag{1}$$
$$= \int_a^b f(x)dx \tag{2}$$
$$= \int_0^8 4x(7-x)^2 dx \tag{3}$$

12. Integral given values:

$$\int_7^8 (-24s + 1)ds \tag{1}$$

$$= \int -24x dx + \int 1 dx \tag{2}$$

$$\tag{3}$$

According to the given values, we have that

$$= -24\left(\frac{15}{2}\right) + 1 \tag{4}$$

$$= -179 \tag{5}$$