Section 7.2. Centroids of Composite Areas

Note. If we have a region A consisting of several disjoint regions, $A = A_1 \cup A_2 \cup \cdots \cup A_N$, then the centroid $(\overline{x}, \overline{y})$ is given by

$$\overline{x} = \frac{\int_A x\,dA}{\int_A dA} = \frac{\int_{A_1} x\,dA + \int_{A_2} x\,dA + \cdots + \int_{A_N} x\,dA}{\int_{A_1} dA + \int_{A_2} dA + \cdots + \int_{A_N} dA}$$

and

$$\overline{y} = \frac{\int_A y\,dA}{\int_A dA} = \frac{\int_{A_1} y\,dA + \int_{A_2} y\,dA + \cdots + \int_{A_N} y\,dA}{\int_{A_1} dA + \int_{A_2} dA + \cdots + \int_{A_N} dA}.$$

If we let

$$\overline{x}_i = \frac{\int_{A_i} x\,dA}{\int_{A_i} dA} \text{ and } \overline{y}_i = \frac{\int_{A_i} y\,dA}{\int_{A_i} dA}$$

then

$$\overline{x}_i = \frac{\sum \overline{x}_i A_i}{\sum A_i} \text{ and } \overline{y}_i = \frac{\sum \overline{y}_i A_i}{\sum A_i}.$$

Example. Page 341 Number 7.35.

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