

## 1.4 Integration by Parts

### Exercises

1. Find the given integrals.

(a)  $\int x e^{-x} dx$ ;

(b)  $\int x e^{x/2} dx$ ;

(c)  $\int (1-x) e^x dx$ ;

(d)  $\int (3-2x) e^{-x} dx$ ;

(e)  $\int t \ln 2t dt$ ;

(f)  $\int t \ln t^2 dt$ ;

(g)  $\int v e^{-v/5} dv$ ;

(h)  $\int v e^{0.1v} dv$ ;

(i)  $\int x \sqrt{x-6} dx$ ;

(j)  $\int x \sqrt{1-x} dx$ ;

(k)  $\int x(x+1)^8 dx$ ;

(l)  $\int (x+1)(x+2)^6 dx$ ;

(m)  $\int \frac{x}{\sqrt{x+2}} dx$ ;

(n)  $\int \frac{x}{\sqrt{2x+1}} dx$ ;

(o)  $\int x^2 e^{-x} dx$ ;

(p)  $\int x^2 e^{3x} dx$ ;

(q)  $\int x^3 e^x dx$ ;

(r)  $\int x^3 e^{2x} dx$ ;

(s)  $\int x^2 \ln x dx$ ;

(t)  $\int x(\ln x)^2 dx$ ;

(u)  $\int x^3 e^{x^2} dx$ ;

2. After  $t$  hours on the job, a factory worker can produce  $100te^{-0.5t}$  units per hour. How many units does the worker produce during the first 3 hours?
3. After  $t$  weeks, contributions in response to a local fund-raising campaign were coming in at the rate of  $2,000te^{-0.2t}$  euros per week. How much money was raised during the first 5 weeks?
4. A manufacturer has found that marginal cost is  $(0.1q + 1)e^{0.03q}$  euros per unit when  $q$  units have been produced. The total cost of producing 10 units is 200 €. What is the total cost of producing the first 20 units?
5. A manufacturer has found that marginal cost is  $1 + 3\ln(x + 1)$  euros per unit when  $x$  units have been produced. If the fixed cost is 100 €, find the total cost function