EXERCISE 12C

INDEFINITE INTEGRALS INVOLVING EXPONENTIAL FUNCTIONS

1. Find integrals of each of the following:

(a) e^{4x}

(b) e^{4x+1}

(c) e^{-x}

(d) $e^{3x}+e^{-2x}$

(e) $5e^{1-6x}$

(f) $6e^{4-x}$

(g) $e^{\frac{x}{2}}$

(h) $\dfrac{e^{2x}-e^{-2x}}{2}$

(i) $\dfrac{1}{e^{3x}}$

(j) x^2+e^{2x}

(k) $\sqrt{x}+3e^{0.5x}$

(l) $5-\dfrac{1}{e^{2x}}$

2. Find the following indefinite integrals:

(a) $\displaystyle\int 3e^{3x}dx$

(b) $\displaystyle\int 2xe^{x^2}dx$

(c) $\displaystyle\int -5e^{4-5x}dx$

(d) $\displaystyle\int 6xe^{x^2}dx$

(e) $\displaystyle\int (3x^2-2x+1)e^{x^3-x^2+x}dx$

(f) $\displaystyle\int xe^{x^2}dx$

(g) $\displaystyle\int 6x^2e^{x^3}dx$

(h) $\displaystyle\int (x+1)e^{x^2+2x}dx$

(i) $\displaystyle\int \dfrac{2dx}{\sqrt{x}e^{\sqrt{x}}}$

(j) $\displaystyle\int e^{ax+b}dx$

(k) $\displaystyle\int \sqrt{e^x}\,dx$

(l) $\displaystyle\int (e^x)^3 dx$

(m) $\displaystyle\int e^{kx}+e^{-kx}dx$

(n) $\displaystyle\int e^{\frac{x}{a}}dx$

(o) $\displaystyle\int \dfrac{e^{3x}+e^x}{e^{5x}}dx$

(p) $\displaystyle\int \dfrac{1}{\sqrt{x}}(e^{\sqrt{x}})^3 dx$

(q) $\displaystyle\int \sqrt{x}\,e^{\left(\sqrt{x}\right)^3}dx$

(r) $\displaystyle\int \sqrt{e^x}-\dfrac{1}{(e^x)^2}dx$

3. Find the equation of the curve for which $\dfrac{dy}{dx}=\dfrac{e^{\sqrt{x+1}}}{\sqrt{x+1}}$ if the curve passes through the point $(0,1)$.

4. Show that $\dfrac{d}{dx}(x^2e^{x^2})=2xe^{x^2}+2x^3e^{x^2}$. Use this result to find $\displaystyle\int x^3e^{x^2}dx$.

ANSWERS 12C

1. (constants of integration omitted)

(a) $\dfrac{1}{4}e^{4x}$

(b) $\dfrac{1}{4}e^{4x+1}$

(c) $-e^{-x}$

(d) $\dfrac{1}{3}e^{3x}-\dfrac{1}{2}e^{-2x}$

(e) $-\dfrac{5}{6}e^{1-6x}$

(f) $-6e^{4-x}$

(g) $2e^{\frac{x}{2}}$

(h) $\dfrac{e^{2x}+e^{-2x}}{4}$

(i) $-\dfrac{1}{3e^{3x}}$

(j) $\dfrac{x^3}{3}+\dfrac{1}{2}e^{2x}$

(k) $\dfrac{2}{3}x^{\frac{3}{2}}+6e^{0.5x}$

(l) $5x+\dfrac{1}{2e^{2x}}$

2.

(a) $e^{3x}+c$

(b) $e^{x^2}+c$

(c) $e^{4-5x}+c$

(d) $3e^{x^2}+c$

(e) $e^{x^3-x^2+x}+c$

(f) $\dfrac{1}{2}e^{x^2}+c$

(g) $2e^{x^3}+c$

(h) $\dfrac{1}{2}e^{x^2+2x}+c$

(i) $\dfrac{-4}{e^{\sqrt{x}}}+c$

(j) $\dfrac{1}{a}e^{ax+b}+c$

(k) $2\sqrt{e^x}+c$

(l) $\dfrac{1}{3}e^{3x}+c$

(m) $\dfrac{1}{k}e^{kx}-\dfrac{1}{k}e^{-kx}+c$

(n) $ae^{\frac{x}{a}}+c$

(o) $-\dfrac{1}{2}e^{-2x}-\dfrac{1}{4}e^{-4x}+c$

(p) $\dfrac{2}{3}e^{3\sqrt{x}}+c$

(q) $\dfrac{2}{3}e^{x^{3/2}}+c$

(r) $2e^{\frac{x}{2}}+\dfrac{1}{2}e^{-2x}+c$

3. $y=2e^{\sqrt{x+1}}+1-2e$

4. $\dfrac{x^2e^{x^2}}{2}-\dfrac{1}{2}e^{x^2}+c$