INTEGRALS LEADING TO INVERSE TRIGONOMETRIC FUNCTIONS[1]

Calculate the following integrals.

(1) $\displaystyle\int \frac{1}{x^2+2x+2}\,dx$

(2) $\displaystyle\int \frac{1}{9x^2-18x+10}\,dx$

(3) $\displaystyle\int \frac{1}{x^2+2x+5}\,dx$

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

(5) $\displaystyle\int \frac{1}{3x^2+12x+16}\,dx$

(6) $\displaystyle\int \frac{1}{2x^2-8x+17}\,dx$

(7) $\displaystyle\int \frac{1}{\sqrt{3+2x-x^2}}\,dx$

(8) $\displaystyle\int \frac{1}{\sqrt{18x-9x^2-8}}\,dx$

(9) $\displaystyle\int \frac{1}{\sqrt{1+2x-x^2}}\,dx$

(10) $\displaystyle\int \frac{1}{\sqrt{5+8x-4x^2}}\,dx$

(11) $\displaystyle\int \frac{1}{\sqrt{7+12x-4x^2}}\,dx$

(12) $\displaystyle\int \frac{1}{\sqrt{11-18x-9x^2}}\,dx$

(13) $\displaystyle\int_{-1}^{1} \frac{1}{x^2+2x+5}\,dx$

(14) $\displaystyle\int_{0}^{2} \frac{1}{\sqrt{1+2x-x^2}}\,dx$

Solutions.

(1) $\arctan(x+1)+C$

(2) $\dfrac{1}{3}\arctan 3(x-1)+C$

(3) $\dfrac{1}{2}\arctan\dfrac{x+1}{2}+C$

(4) $\dfrac{1}{\sqrt{2}}\arctan\dfrac{x-1}{\sqrt{2}}+C$

(5) $\dfrac{1}{2\sqrt{3}}\arctan\dfrac{\sqrt{3}(x+2)}{2}+C$

(6) $\dfrac{1}{3\sqrt{2}}\arctan\dfrac{\sqrt{2}(x-2)}{3}+C$

(7) $\arcsin\dfrac{x-1}{2}+C$

(8) $\dfrac{1}{3}\arcsin 3(x-1)+C$

(9) $\arcsin\dfrac{x-1}{\sqrt{2}}+C$

(10) $\dfrac{1}{2}\arcsin\dfrac{2(x-1)}{3}+C$

(11) $\dfrac{1}{2}\arcsin\dfrac{2x-3}{4}+C$

(12) $\dfrac{1}{3}\arcsin\dfrac{3(x+1)}{2\sqrt{5}}+C$

(13) $\dfrac{\pi}{8}$

(14) $\dfrac{\pi}{2}$

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[1]Notes for Course Mathematics 4.3 at Brooklyn College of CUNY. Attila Máté, September 8, 2002. Revised September 17, 2002.