

MATHEMATICAL ANALYSIS

PROBLEMS LIST 11

17.12.10

(1) Compute the indefinite integral $\int f(x) dx$ where f is given by the formula:

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| (a) $\frac{5x^2 - 12}{(x^2 - 6x + 13)^2},$ | (b) $\arctan(x),$ | (c) $\arctan \sqrt{x},$ |
| (d) $\frac{1}{1 + \sqrt{x+1}},$ | (e) $x^2 \log(x+1),$ | (f) $\frac{x}{(x+1)(2x+1)},$ |
| (g) $\frac{x}{x^2 - 7x + 10},$ | (h) $\frac{x-2}{x^2 - 7x + 12},$ | (i) $\frac{x}{2x^2 - 3x - 2},$ |
| (j) $\frac{4x+3}{(x-2)^3},$ | (k) $\frac{x^3+1}{x^3-x^2},$ | (l) $\frac{x^4}{x^2+1},$ |
| (m) $\frac{1}{(x^2+9)^3},$ | (n) $\frac{x^3+x-1}{(x^2+2)^2},$ | (o) $\frac{\sqrt{x}}{\sqrt{x}-\sqrt[3]{x}},$ |
| (p) $\frac{1}{x\sqrt{x+1}},$ | (q) $\frac{1}{1+\sqrt[3]{x+1}},$ | (r) $\frac{e^x-1}{e^x+1} \quad (t = e^x),$ |
| (s) $\log(1+x^2),$ | (t) $\frac{x^2}{1+x^3},$ | (u) $x \cdot \log(x^2+1),$ |
| (v) $\frac{1}{x^2-x-1},$ | (w) $\frac{7x^6+3x^2+4x}{x^7+x^3+2x^2+4},$ | (x) $\sqrt{x} \cdot \log(x),$ |
| (y) $\frac{e^x}{e^{2x}+1},$ | (z) $\frac{e^{2x}}{e^{2x}+1},$ | (aa) $\frac{e^x}{e^{3x}-1},$ |
| (ab) $\frac{1}{(x+1)\sqrt{x}},$ | (ac) $\frac{\sqrt{x+1}+1}{\sqrt{x+1}-1},$ | (ad) $\frac{1}{x^6+x^4},$ |
| (ae) $\frac{1}{(x^2+2x+2)(x^2-4)},$ | (af) $\frac{1}{\sqrt{1+\sqrt[3]{x+2}}},$ | (ag) $\frac{x^4}{x^{15}-1},$ |
| (ah) $\frac{1}{x^4+1},$ | (ai) $x^2 \arctan(x),$ | (aj) $\frac{2x^2+41x-91}{(x-1)(x+3)(x-4)}.$ |

(2) Express I_n in the terms of I_{n-1} or I_{n-2}

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| (a) $I_n(x) = \int \frac{1}{(x^2+4)^n} dx,$ | (b) $I_n(x) = \int x^n e^x dx,$ |
| (c) $I_n(x) = \int \sin^n(x) dx,$ | (d) $I_n(x) = \int x^n \sin(x) dx,$ |
| (e) $I_n(x) = \int \log^n(x) dx,$ | (f) $I_n(x) = \int x^n e^{x^2} dx.$ |