

Mat104 Fall 2002, Integration Problems From Old Exams

Compute the following integrals

$$(1) \quad \int \frac{\sin^5 x}{\cos x} dx$$

$$(2) \quad \int \frac{dx}{(4+x^2)^{5/2}}$$

$$(3) \quad \int \sin(\sqrt{1+x}) dx$$

$$(4) \quad \int \arctan(x) dx$$

$$(5) \quad \int \cos^4 x dx$$

$$(6) \quad \int_0^{\pi/2} \frac{\cos x}{4 - \sin^2 x} dx$$

$$(7) \quad \int \frac{\ln(1 + \ln x)}{x} dx$$

$$(8) \quad \int x^2 \arctan x dx$$

$$(9) \quad \int_{-1}^2 \frac{dx}{(4+2x+x^2)^{5/2}}$$

$$(10) \quad \int x \sin(x^2) e^{x^2} dx$$

$$(11) \quad \int \frac{dx}{\sqrt{x^2 + 25}}$$

$$(12) \quad \int \frac{2+x}{\sqrt[3]{x+2+x}} dx$$

$$(13) \quad \int \frac{3x^2}{x^2 + x - 2} dx$$

$$(14) \quad \int \frac{\cos \sqrt[3]{x}}{\sqrt[3]{x}} dx$$

$$(15) \quad \int \frac{dx}{\sqrt{x^2 + 2x}}$$

$$(16) \quad \int \frac{x^2 + 3x - 3}{(x+1)(x^2 + 6x + 10)} dx$$

$$(17) \quad \int \frac{dx}{x\sqrt{1-x^2}}$$

$$(18) \quad \int x^3 e^{x^2} dx$$

$$(19) \quad \int x^2 \ln x dx$$

$$(20) \quad \int \frac{x^3}{\sqrt{1-x^2}} dx$$

$$(21) \quad \int \tan^4 \theta d\theta$$

$$(22) \quad \int \frac{x+1}{x^2 + 4x + 13} dx$$

$$(23) \quad \int_0^{\pi/2} \frac{\cos x}{\sin^2 x + 5 \sin x + 6} dx$$

$$(24) \quad \int \frac{e^{x/2}}{1+e^x} dx$$

$$(25) \quad \int \frac{2x^2 + 5x + 10}{x^3 + 2x^2 + 10x} dx$$

$$(26) \quad \int (x-2)\sqrt{9-x^2} dx$$

$$(27) \quad \int_1^{\sqrt{e}} \frac{\arcsin(\ln x)}{x} dx$$

$$(28) \quad \int_0^1 xe^{-x} dx$$

$$(29) \int (\ln x)^2 dx$$

$$(30) \int \frac{\sin x}{\sqrt{1 + \cos x}} dx$$

$$(31) \int \frac{x^2}{x^6 - 1} dx$$

(Hint: Try a substitution first.)

$$(32) \int \sin^5 x \cos^2 x dx$$

$$(33) \int \frac{1 + e^x}{1 - e^x} dx$$

$$(34) \int_1^e \sin(\ln x) dx$$

$$(35) \int e^{\sqrt{x}} dx$$

$$(36) \int \frac{dx}{(4 - x^2)^{3/2}}$$

$$(37) \int_2^3 \frac{e^{1/x}}{x^2} dx$$

$$(38) \int \frac{\sqrt{x^2 - 4}}{x^3} dx$$

$$(39) \int \frac{x - 1}{x^3 + x} dx$$

$$(40) \int \frac{dx}{x^2 \sqrt{x^2 + 4}}$$

$$(41) \int \sin(\sqrt{x}) dx$$

$$(42) \int \frac{dx}{x(1 - x)^2}$$

$$(43) \int \frac{(x - 5)(\sqrt{x - 1} + 3)}{\sqrt{x - 1} + 2} dx$$

$$(44) \int (2x + 3) \ln x dx$$

$$(45) \int \frac{\sqrt{9 + x^2}}{x^2} dx$$

$$(46) \int \frac{x}{(x^2 + 1)(x + 1)} dx$$

$$(47) \int_0^1 (e^x + 1)^{20} e^x dx$$

$$(48) \int \frac{x^2}{x^2 + 4x + 5} dx$$

$$(49) \int \frac{x + 1}{x^2 + 2x + 3} dx$$