

201-203-RE - Practice Set #17: Improper Integrals

Evaluate the following improper integrals.

$$(1) \int_4^{\infty} \frac{6}{(4-3x)^{1/3}} dx$$

$$(2) \int_{-\infty}^1 \frac{4x-6}{(x^2-3x+3)^3} dx$$

$$(3) \int_1^{\infty} \frac{6x}{9+x^2} dx$$

$$(4) \int_{-\infty}^{-2} \frac{2x^3+1}{(x^4+2x)^3} dx$$

$$(5) \int_1^{\infty} 6x^2 e^{1-x^3} dx$$

$$(6) \int_0^{\infty} \frac{9x^2}{(x^3+1)^{5/3}} dx$$

$$(7) \int_0^{\infty} \frac{x^2+1}{(x^3+3x+4)^{5/2}} dx$$

$$(8) \int_0^1 \frac{2x+7}{\sqrt[3]{x^2+7x-8}} dx$$

$$(9) \int_0^1 \frac{e^{2x}}{1-e^{2x}} dx$$

$$(10) \int_1^2 \frac{2x^2+1}{\sqrt{(2x^3+3x-5)^3}} dx$$

$$(11) \int_3^7 \frac{e^{\sqrt{x-3}}}{\sqrt{x-3}} dx$$

$$(12) \int_0^{\pi/4} \cot(3x) dx$$

$$(13) \int_0^{\pi/4} \sec(2x) \tan(2x) dx$$

$$(14) \int_{-\infty}^{-1} \frac{3x}{(1-x^2)^2} dx$$

$$(15) \int_0^{\pi/6} \frac{3 \cos(x)}{(2 \sin(x))^{1/3}} dx$$

$$(16) \int_0^1 \frac{e^{\sqrt{x}}}{\sqrt{x}(e^{\sqrt{x}}+1)^2} dx$$

$$(17) \int_2^{\infty} \frac{2x+1}{\sqrt[4]{x^2+x-2}} dx$$

$$(18) \int_0^{\infty} \frac{4x}{(x^2+1)^4} dx$$

$$(19) \int_0^{\pi/8} \frac{\sec^2(2x)}{\sqrt{1-\tan(2x)}} dx$$

$$(20) \int_{-2}^0 \frac{6x}{\sqrt{4-x^2}} dx$$

$$(21) \int_2^{\infty} \frac{4}{x(\ln(x))^2} dx$$

$$(22) \int_0^{\pi/3} \frac{\sin(3x)}{(1+\cos(3x))^{2/3}} dx$$

$$(23) \int_{-\infty}^0 \frac{e^{3x}}{(3-e^{3x})^2} dx$$

ANSWERS:

(1) Diverges

(2) -1

(3) Diverges

(4) -1/576

(5) 2

(6) 9/2

(7) 1/36

(8) -6

(9) Diverges

(10) Diverges

(11) $2(e^2 - 1)$

(12) Diverges

(13) Diverges

(14) Diverges

(15) 9/4

(16) $1 - \frac{2}{e+1}$

(17) Diverges

(18) 2/3

(19) 1

(20) -12

(21) $4/\ln(2)$

(22) $\sqrt[3]{2}$

(23) 1/18