Integrali

Giustificare tutti i passaggi mediante la teoria studiata.

1. Calcolare i seguenti integrali (specificando se si tratta di integrali indefiniti, definiti, impropri):

   (a) $\int_1^e x \log^2 x \, dx$ $\quad \int \frac{x-1}{x^2(x^2+3)} dx$ $\quad \int_1^{+\infty} \frac{e^x}{e^{2x}+1} dx$;

   (b) $\int \frac{x+1}{x^2(x^2+2)} dx$ $\quad \int_1^{+\infty} \frac{1}{x(\log^2 x+1)} dx$ $\quad \int_1^{+\infty} \frac{dx}{x^2+x^4} dx$;

   (c) $\int_1^2 \frac{x-1}{x^3+4x} dx$ $\quad \int_0^{+\infty} \frac{1}{\sqrt{x}(x+1)} dx$ $\quad \int \frac{dx}{e^{2x}-1}$;

   (d) $\int_2^{+\infty} \frac{dx}{x^2(x-1)}$ $\quad \int_0^{\pi} \operatorname{sen} x \cos^2 x \, dx$ $\quad \int_2^6 \frac{x^5}{x^4-1} dx$;

   (e) $\int_1^2 \frac{x}{\sqrt{4-x^2}} dx$ $\quad \int_0^1 \log \frac{1}{x} \, dx$ $\quad \int \frac{dx}{x(1-x^2)}$;

   (f) $\int_1^{+\infty} \frac{\log x}{x\sqrt[3]{(\log^2 x+3)^2}} dx$ $\quad \int \frac{x+2}{x^3-2x^2+x} dx$ $\quad \int_1^{+\infty} \frac{\log^2 x+1}{x(\log^3 x-1)} dx$;

   (g) $\int_2^6 \frac{\operatorname{arctg} x}{(x-1)^2} dx$ $\quad \int \frac{dx}{x^2(x^2+x+2)}$ $\quad \int_0^{\pi/4} x \cos x \, dx$.