

1. (a) (10%) Evaluate $\int_0^\infty \frac{e^{-\sqrt{x}}}{\sqrt{x}} dx$.
(b) (5%) Evaluate $\int_{-\infty}^0 x e^x dx$.
2. (15%) Find $\int_0^1 \frac{3x^3+5x^2+5x+1}{(x+1)^2(x^2+1)} dx$.
3. Find the integral
 - (a) (10%) $\int_1^{\sqrt{3}} \frac{1}{(1+x^2)^{3/2}} dx$.
 - (b) (5%) $\int \frac{x^2}{\sqrt{9-x^2}} dx$.
4. Find the integral
 - (a) (10%) $\int \tan^3 x \sec^7 x dx$.
 - (b) (5%) $\int \sin^4 x \cos^3 x dx$.
5. (10%) Find $\int \frac{4x^2-4x+6}{x^3-x^2-6x} dx$.
6. Find the integral
 - (a) (5%) $\int_1^e \ln x dx$,
 - (b) (5%) $\int x \ln x dx$.
7. (10%) Evaluate $\lim_{x \rightarrow 0^+} x^x$.
8. Evaluate
 - (a) (5%) $\lim_{x \rightarrow 0} \frac{e^x-1}{2x}$.
 - (b) (5%) $\lim_{x \rightarrow \infty} \frac{x^3}{e^{2x}} dx$.