

Integration Practice

You can use any of the Differentiation Rules on page 5 of the Reference Pages at the back of the textbook. Any other answer must be justified by your work.

1. Which method or methods would you use for the following integrals? If you are not sure of your method, carry it out to evaluate the integral.

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

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

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

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

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

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

2. Which method or methods would you use for the following integrals? If you are not sure of your method, carry it out to evaluate the integral.

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

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

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

3. Try to evaluate the first integral. If you can do it, great! If not, skip to the next one for inspiration.

(a) $\int \sin x \cos x e^{\sin^2 x} dx$

(b) $\int x e^{x^2} dx$

(c) $\int e^x dx$

Bonus: $\int_{-1}^1 x e^{x^4} dx$

4. Try to evaluate the first integral. If you can do it, great! If not, skip to the next one for inspiration.

(a) $\int \tan^3 x \sec^2 x e^{\tan^2 x} dx$

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

(c) $\int x e^x dx$

5. Try to evaluate the first integral. If you can do it, great! If not, skip to the next one for inspiration.

(a) $\int \frac{2x+3}{\sqrt{5+4x-x^2}} dx$

(b) $\int \frac{5x+13}{\sqrt{4-x^2}} dx$

(c) $\int \frac{3x+7}{\sqrt{1-x^2}} dx$

6. Try to evaluate the first integral. If you can do it, great! If not, skip to the next one for inspiration.

(a) $\int \frac{2x+7}{x^2+6x+13} dx$

(b) $\int \frac{-x+1}{x^2+9} dx$

(c) $\int \frac{7x-2}{x^2+1} dx$

7. Try to evaluate the first integral. If you can do it, great! If not, skip to the next one for inspiration.

(a) $\int \frac{x^4+2}{x^3+2x^2+x} dx$

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

(c) $\int \frac{7x-2}{x(x+1)(x-3)} dx$

(d) $\int \frac{23}{x+1} dx$

8. Evaluate the following integrals.

(a) $\int x \tan^{-1} x dx$

(b) $\int_{-1}^3 |x^2 - 4| dx$

(c) $\int \cos^3(5x) \sin^2(5x) dx$

(d) $\int \ln(x^2 - 5x) dx$

$$(e) \int \frac{1}{\sin^2 x + \cos 2x} dx$$

$$(f) \int \frac{1 - \tan \theta}{1 + \tan \theta} d\theta$$

$$(g) \int_{\pi/4}^{\pi/3} \frac{\sqrt{\tan \theta}}{\sin(2\theta)} d\theta$$

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