

# Chapter 05\_Assignment

**Ex 1:** Evaluate:

$$1. \int \left( \frac{1}{x} + \sqrt{x} - 3x^2 + 1 \right) dx$$

$$3. \int \frac{t}{t^2 + 1} dt$$

$$5. \int_0^1 y \left( 1 + y^2 \right)^5 dy$$

$$7. \int x^3 \sin(x^4 + 1) dx$$

$$2. \int x e^{x^2} dx$$

$$4. \int \frac{\ln x}{x} dx$$

$$6. \int_0^2 x^2 \sqrt{x^3 + 1} dx$$

$$8. \int x^2 \sqrt[4]{1 - x^3} dx$$

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**Ex 2:** Evaluate:

$$1. \int xe^x dx$$

$$3. \int_0^{\pi/2} x \sin x dx$$

$$5. \int_1^e x \ln x dx$$

$$2. \int_0^1 x^2 e^{-x} dx$$

$$4. \int \ln x dx$$

$$6. \int_0^1 e^{\sqrt{x}} dx$$

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## Ex 3:

Suppose  $f(x)$  is differentiable,  $f(1) = 4$  and  $\int_0^1 f(x)dx = 5$

Evaluate  $\int_0^1 xf'(x)dx$ .

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## Ex 4:

Suppose  $f(x)$  is differentiable,  $f(1) = 3, f(3) = 1$  and

$\int_1^3 xf'(x)dx = 13$ . What is the average value of  $f$  on the

interval  $[1, 3]$  ?

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**Ex 5:** Determine whether each integral is convergent or divergent. Evaluate those that are convergent.

$$1. \int_3^{\infty} \frac{1}{(x-2)^{3/2}} dx$$

$$3. \int_{-\infty}^0 \frac{1}{3-4x} dx$$

$$5. \int_2^{\infty} e^{-5p} dp$$

$$7. \int_0^{\infty} \frac{x^2}{\sqrt[4]{1+x^3}} dx$$

$$2. \int_0^{\infty} \frac{1}{\sqrt[4]{1+x}} dx$$

$$4. \int_1^{\infty} \frac{1}{(2x+1)^3} dx$$

$$6. \int_{-\infty}^0 2^r dr$$

$$8. \int_{-\infty}^{\infty} (y^3 - 3y^2) dy$$

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**Ex 6:** Determine whether each integral is convergent or divergent. Evaluate those that are convergent.

$$9. \int_{-\infty}^{\infty} xe^{-x^2} dx$$

$$10. \int_{-\infty}^{\infty} x^2 e^{-x^3} dx$$

$$11. \int_{-\infty}^0 ze^{2z} dz$$

$$12. \int_{-\infty}^{\infty} \cos \pi t dt$$

$$13. \int_1^{\infty} \frac{\ln x}{x} dx$$

$$14. \int_{-\infty}^6 re^{r/3} dr$$

$$15. \int_1^{\infty} \frac{1}{x^2 + x} dx$$

$$16. \int_1^{\infty} \frac{\ln x}{x^3} dx$$

$$17. \int_{-\infty}^{\infty} \frac{x^2}{9 + x^6} dx$$

$$18. \int_0^{\infty} \frac{e^x}{e^{2x} + 3} dx$$

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**Ex 7:** Determine whether each integral is convergent or divergent. Evaluate those that are convergent.

$$1. \int_0^1 \frac{3}{x^5} dz$$

$$3. \int_{-2}^{14} \frac{dx}{\sqrt[4]{x+2}}$$

$$5. \int_{-2}^3 \frac{1}{x^4} dx$$

$$7. \int_0^9 \frac{1}{\sqrt[3]{x-1}} dx$$

$$2. \int_2^3 \frac{1}{\sqrt{3-x}} dx$$

$$4. \int_6^8 \frac{4}{(x-6)^3} dr$$

$$6. \int_0^1 \frac{1}{\sqrt{1-x^2}} dx$$

$$8. \int_0^5 \frac{w}{w-2} dw$$

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**Ex 8:** Use the Comparison Theorem to determine whether the integral is convergent or divergent.

$$1. \int_1^{\infty} \frac{\cos^2 x dx}{1+x^2}$$

$$3. \int_1^{\infty} \frac{dx}{x+e^{2x}}$$

$$5. \int_0^{\infty} \frac{x}{x^3+1} dx$$

$$7. \int_0^1 \frac{\cos^2 x}{\sqrt{x}} dx$$

$$2. \int_1^{\infty} \frac{2+e^{-x}}{x} dx$$

$$4. \int_1^{\infty} \frac{x dx}{\sqrt[4]{1+x^6}}$$

$$6. \int_0^{\infty} \frac{\arctan x}{2+e^x} dx$$

$$8. \int_0^1 \frac{1}{x\sqrt{x}\cos^2 x} dx$$

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## Ex 9:

Find the values of  $p$  for which the integral converges and evaluate the integral for those values of  $p$

$$\int_e^{\infty} \frac{1}{x(\ln x)^p} dx$$