

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 2.3

Math 1001 Worksheet

FALL 2025

For practice only. Not to be submitted.

1. Use the First Fundamental Theorem to find $F'(x)$ for each of the following.

(a) $F(x) = \int_{-3}^x (t^2 + 3)^{\cos(t)} dt$

(b) $F(x) = \int_0^{\tan(x^2)} t dt$

(c) $F(x) = \int_{e^x}^{100} e^t dt$

(d) $F(x) = \int_{x^3}^x \sqrt{t} dt$

2. Repeat Question 2 from Worksheet 2.2 using the Second Fundamental Theorem.

(a) $\int_0^2 \frac{x^3}{4} dx$

(b) $\int_2^3 (2 - 7x) dx$

3. Evaluate the following definite integrals using the Second Fundamental Theorem.

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

(b) $\int_0^1 (x + 1)(2x - 3) dx$

(c) $\int_{\frac{\pi}{8}}^{\pi} \cos(2x) dx$

(d) $\int_2^0 (4t + 1)^{-\frac{5}{2}} dt$

(e) $\int_{-2}^0 \frac{3x + 8}{3x + 7} dx$

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

(g) $\int_{-1}^{e^3-2} \frac{\ln(x+2)}{x+2} dx$

- (h) $\int_0^\pi \cos(\cos(\theta)) \sin(\theta) d\theta$
- (i) $\int_{\frac{1}{2}}^4 \frac{1}{x^2} \sqrt{2 + \frac{1}{x}} dx$
- (j) $\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} \csc^2\left(\frac{x}{3}\right) \left[1 - e^{-\cot(\frac{x}{3})}\right] dx$
- (k) $\int_0^k x^2(k^3 - x^3)^{\frac{4}{3}} dx$ where k is a constant
- (l) $\int_{\sqrt{3}}^{\sqrt{2}} \frac{1}{\sqrt{1 - \frac{x^2}{4}}} dx$
- (m) $\int_0^4 \frac{1}{\sqrt{t(t+4)}} dt$
- (n) $\int_{\sqrt{e}}^e \frac{1}{x \ln(x) \sqrt{16(\ln(x))^2 - 4}} dx$
- (o) $\int_1^3 \frac{\ln(x)}{x^4} dx$
- (p) $\int_{\arcsin(\frac{3}{5})}^{\frac{\pi}{2}} \cos(x) \ln(\sin(x)) dx$
- (q) $\int_0^1 x \arcsin(x^2) dx$
- (r) $\int_{-5}^{-1} |2x + 8| dx$
- (s) $\int_{-1}^4 |x^2 - 4x + 3| dx$

4. Use the Second Fundamental Theorem to find the area under the curve $y = \frac{2}{\sqrt{2x - \frac{3}{2}}}$ on the interval $[\frac{11}{4}, \frac{35}{4}]$.