

```
> # Prof. Dr. Serkan Dağ
# ME 310 Numerical Methods
# File 10.1
# Integration commands in MAPLE
```

```
> restart :
Digits := 16 :
```

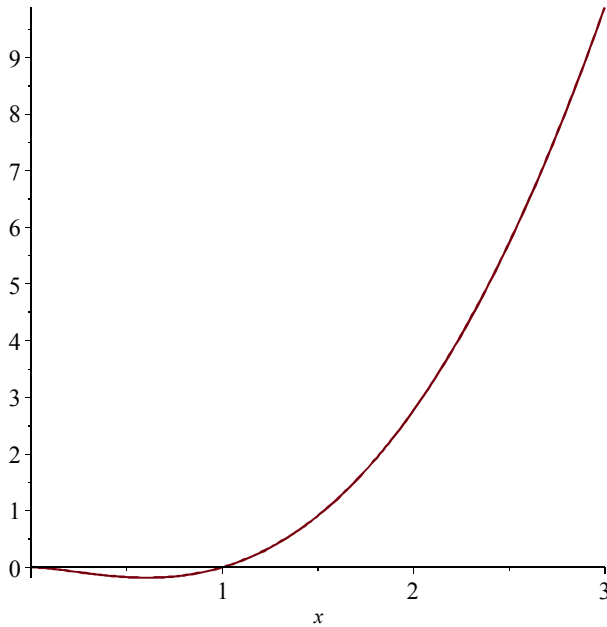
```
> # Define the function to be integrated
```

```
> f := x^2 · ln(x);
```

$$f := x^2 \ln(x)$$

(1)

```
> plot(f, x = 0 .. 3);
```



```
> # Indefinite integration
```

```
> int(f, x);
```

$$\frac{1}{3} x^3 \ln(x) - \frac{1}{9} x^3$$

(2)

```
> # Definite integration
```

```
# First tries to find the closed form expression then substitutes the integration limits
```

```
# Symbolic integration is used if the limits are not floating—point numbers
```

```
> int(f, x = 1 .. 3);
```

$$-\frac{26}{9} + 9 \ln(3)$$

(3)

> # Definite integration  
# Directly applies a numerical method without trying to find the closed form expression

> evalf(Int(f, x = 1 .. 3));

6.998621709124098

(4)

> # Consider a different function

> restart :

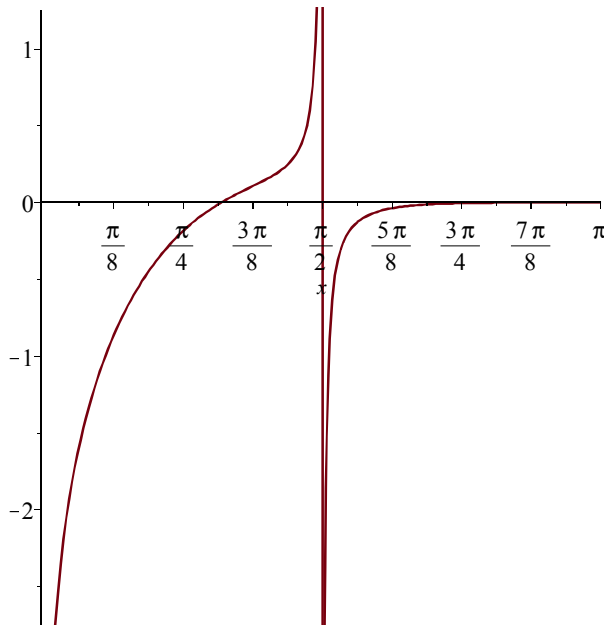
Digits := 16 :

> f :=  $\frac{\exp(-x^2) \cdot \ln(x)}{\cos(x)}$ ;

$$f := \frac{e^{-x^2} \ln(x)}{\cos(x)}$$

(5)

> plot(f, x = 0 .. Pi);



> # Indefinite integration

> int(f, x);

$$\int \frac{e^{-x^2} \ln(x)}{\cos(x)} dx$$

(6)

> # Cannot return the closed-form expression

> # Definite integration

```
> int(f, x = Pi/6 .. Pi/3);
```

$$\int_{\frac{1}{6}\pi}^{\frac{1}{3}\pi} \frac{e^{-x^2} \ln(x)}{\cos(x)} dx$$

(7)

```
> # Didnot return the result because closed-form expression is not known
```

```
> evalf(Int(f, x = Pi/6 .. Pi/3));
```

-0.1111004588770046

(8)

```
> # Integral is evaluated numerically
```

```
>
```