Theorem 7.1:

Suppose that f'' is continuous on $[a, b]$.

Let $I = \int_a^b f(x)\, dx$.

Let K be any upper bound on $|f''|$ on $[a, b]$. i.e. $|f''(x)| \leq K$ for all $x \in [a, b]$.

Then

$$|I - T_n| \leq \frac{K(b-a)^3}{12n^2} \qquad \text{and} \qquad |I - M_n| \leq \frac{K(b-a)^3}{24n^2}$$

Let $I = \int_5^{10} \cos\left(\left(\frac{x^2}{3}\right) + x\right) dx$

1. Use Maple to calculate T_{1000}:

   - Load the student package: *Tools-Load Package-Student Calculus 1*.
   - Type in:

```
f:= x -> cos(x^2/3)+x;
L:=RiemannSum(f(x), x=5..10, partition=1000,method=left,
   output=sum);
R:=RiemannSum(f(x),x=5..10, partition=1000, method=right,
   output=sum);
T:=(L+R)/2;
```

   - Right-click on the output of T and choose to approximate.

2. How close is T_{1000} to the actual value of I?

```
plot(abs(diff(f(x),x,x)),x=5..10);
```

3. Determine how many subintervals n you need to use in order for M_n to approximate I within 0.0001. Find M_n using Maple. [method=midpoint, output=sum; approximate]