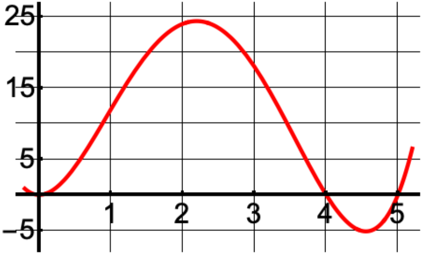
Talk with the people around you for a minute

L_{10} will underestimate $\int_0^2 f(x)\,dx$



Plot of $y = f(x)$

(a) True, and I can explain why

(b) True, but I am unsure why

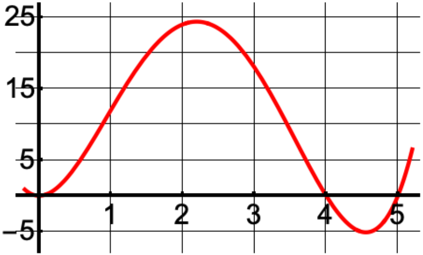
(c) False, and I can explain why

(d) False, but I am unsure why

(e) Ummmm . . .

Talk with the people around you for a minute

R_{10} will overestimate $\int_3^4 f(x)\,dx$



Plot of $y = f(x)$

(a) True, and I can explain why

(b) True, but I am unsure why

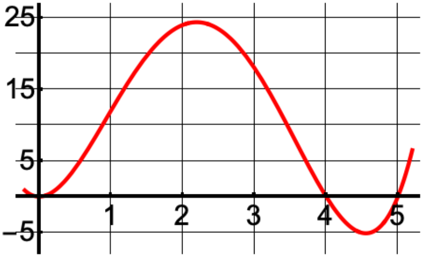
(c) False, and I can explain why

(d) False, but I am unsure why

(e) Ummmm . . .

Talk with the people around you for a minute

T_{10} will overestimate $\int_1^3 f(x)\,dx$



Plot of $y = f(x)$

(a) True, and I can explain why

(b) True, but I am unsure why

(c) False, and I can explain why

(d) False, but I am unsure why

(e) Ummmm . . .

Example: Let $\mathcal{I} = \int_0^4 \sin(x^2) + 3 \, dx$

1. Calculate T_{15} and S_{15} to approximate $\mathcal{I}$

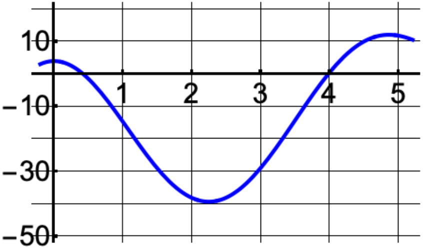
   Useful WolframAlpha syntax:

   ```
   trapezoidal rule of sin(x^2)+3 from x=0 to x=4 with 15 subdivisions
   ```

Talk with the people around you for a minute

Using Theorem 5.5.1, $M_2 = 20$

is a valid value for $\int_4^5 f(x)\,dx$



Plot of $y = f''(x)$

(a) True, and I can explain why

(b) True, but I am unsure why

(c) False, and I can explain why

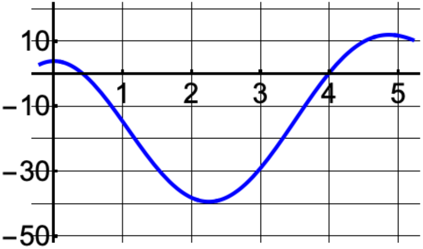
(d) False, but I am unsure why

(e) Ummmm . . .

Talk with the people around you for a minute

Using Theorem 5.5.1, $M_2 = 20$

is a valid value for $\int_1^5 f(x)\,dx$



Plot of $y = f''(x)$

(a) True, and I can explain why

(b) True, but I am unsure why

(c) False, and I can explain why

(d) False, but I am unsure why

(e) Ummmm . . .

Example: Let $\mathcal{I} = \int_0^4 \sin(x^2) + 3\, dx$

1. Calculate T_{15} and S_{15} to approximate $\mathcal{I}$

   Useful WolframAlpha syntax:

   ```
   trapezoidal rule of sin(x^2)+3 from x=0 to x=4 with 15 subdivisions
   ```

2. What is the error from using the trapezoidal rule?

   Useful Desmos syntax:

   ```
   | d/dx  d/dx  sin(x^2) + 3| {0 <= x <= 4}
   ```

3. What is the error from using Simpson's rule?

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

1. Calculate T_{30} and use Theorem 5.5.1 to determine the size of the error $|\mathcal{I} - T_{30}|$

2. Calculate S_{30} and use Theorem 5.5.1 to determine the size of the error $|\mathcal{I} - S_{30}|$