CENGAGE | WEBASSIGN

davidcorzo@ufm.edu (sign out)

6.5 Valor Promedio (Homework)

INSTRUCTOR
Christiaan Ketelaar
Universidad Francisco Marroquin

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10
POINTS	3/3 ✓	3/3 ✓	3/3 ✓	3/3 ✓	3/3 ✓	3/3 ✓	3/3 ✓	3/3 ✓	3/3 ✓	3/3 ✓

TOTAL SCORE

30/30 100.0%

Due Date

DECEMBER 21
11:59 PM CST

Request Extension

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

---

1. 3/3 points Previous Answers SCalcET8 6.5.001. My Notes Ask Your Teacher

Find the average value f_{ave} of the function f on the given interval.

$$f(x) = 3x^2 + 8x, \quad [-1, 3]$$

$f_{ave} =$

15

2. 3/3 points Previous Answers SCalcET8 6.5.005. My Notes Ask Your Teacher

Find the average value f_{ave} of the function f on the given interval.

$$f(t) = e^{\sin(t)} \cos(t), \quad [0, \pi/2]$$

f_{ave} =

2π(e−1)

3. 3/3 points Previous Answers SCalcET8 6.5.008. My Notes Ask Your Teacher

Find the average value h_{ave} of the function h on the given interval.

$$h(u) = (\ln(u))/u, \quad [1, 8]$$

h_{ave} =

ln2(8)14

Need Help? Talk to a Tutor

4. 3/3 points Previous Answers SCalcET8 6.5.009. My Notes Ask Your Teacher

Consider the given function and the given interval.

$f(x) = (x - 3)^2, \quad [2, 5]$

(a) Find the average value f_{ave} of f on the given interval.

$f_{ave} =$

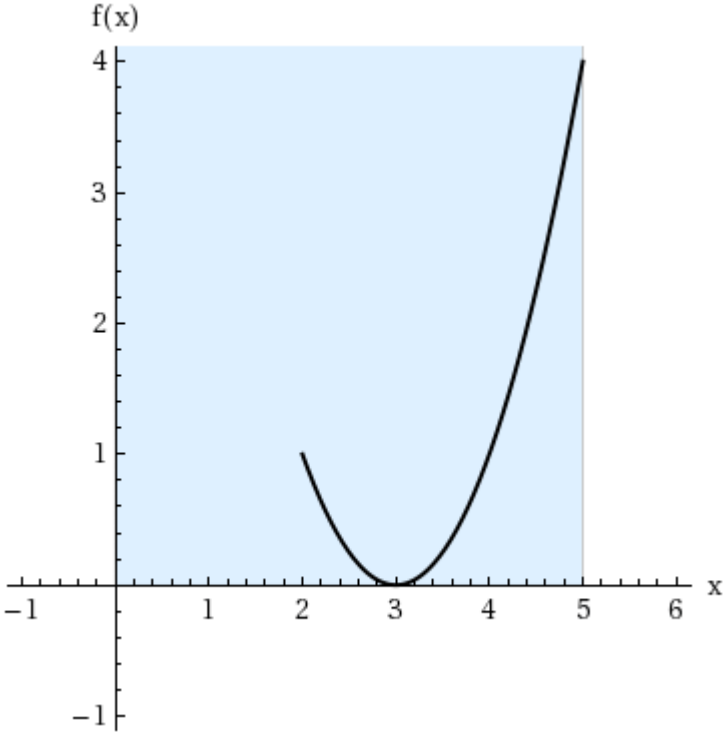
1

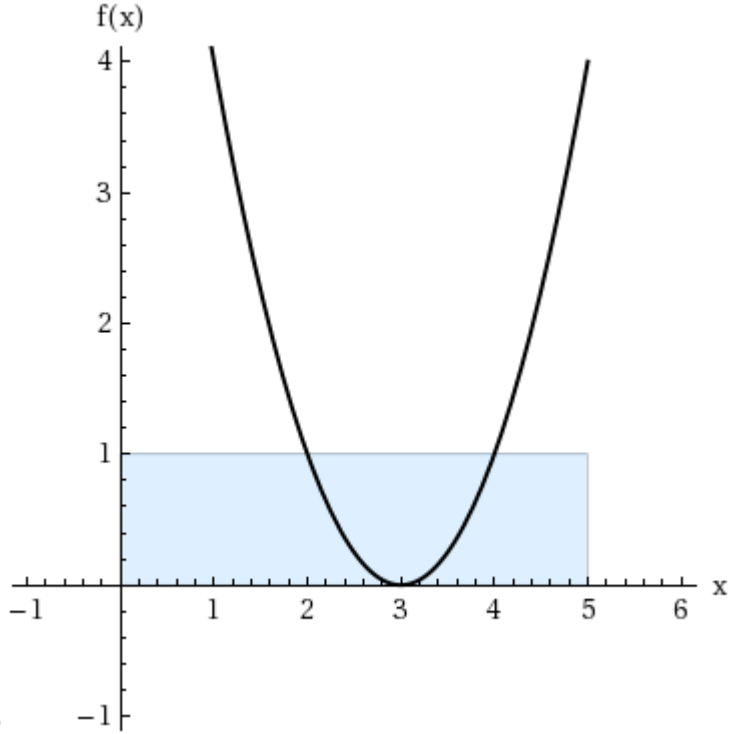
(b) Find c such that $f_{ave} = f(c)$.

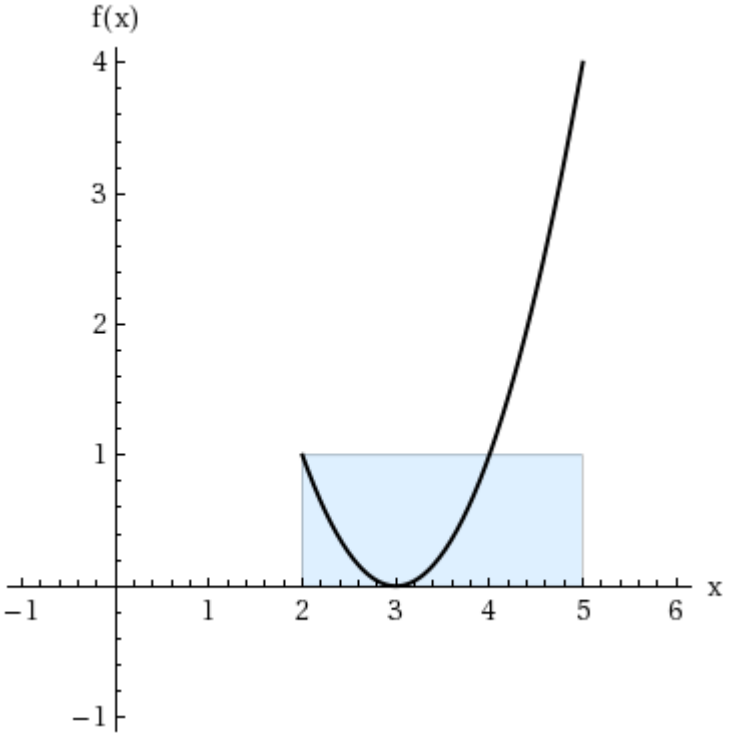
$c =$ 2 (smaller value)

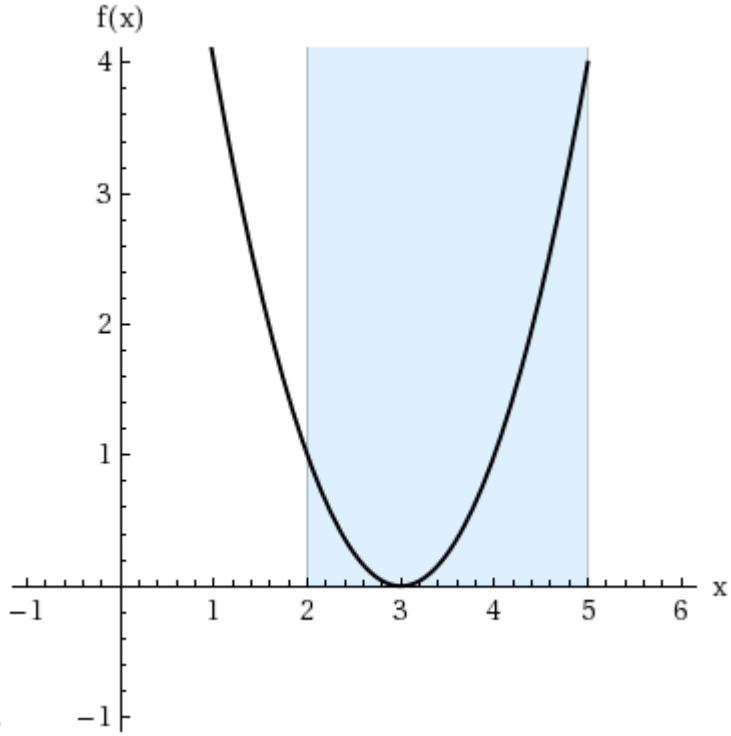
$c =$ 4 (larger value)

(c) Sketch the graph of f and a rectangle whose area is the same as the area under the graph of f.


f(x)
x
4
3
2
1
−1
−1
1
2
3
4
5
6


f(x)
x
4
3
2
1
−1
−1
1
2
3
4
5
6


f(x)
4
3
2
1
−1
−1
1
2
3
4
5
6
x


f(x)
4
3
2
1
−1
−1
1
2
3
4
5
6
x

5. 3/3 points Previous Answers SCalcET8 6.5.017.MI.SA. My Notes Ask Your Teacher

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

In a certain city the temperature (in °F) t hours after 9 AM was modeled by the function

$$T(t) = 55 + 18 \sin\left(\frac{\pi t}{12}\right).$$

Find the average temperature T_{ave} during the period from 9 AM to 9 PM.

Step 1

Let 9:00 AM correspond to $t = 0$ hours. Then, 9:00 PM corresponds to $t =$ 12 ✓ 12 hours.

Step 2

We must find $T_{ave} = \frac{1}{12 - 0} \int_0^{12} \left(55 + 18 \sin\left(\frac{\pi t}{12}\right)\right) dt$.

Step 3

Using properties of the integral, we know the following.

$$\int_0^{12} \left(55 + 18 \sin\left(\frac{\pi t}{12}\right)\right) dt = \int_0^{12} 55\, dt + 18 \int_0^{12} \sin\left(\frac{\pi t}{12}\right) dt$$

By evaluating the first integral, we get

$$\int_0^{12} 55\, dt = \left[\$\$55t \right]_0^{12}$$

✓ $55t$

$$= 660 \checkmark \; 660.$$

Step 4

The second integral $18\int_0^{12} \sin\left(\frac{\pi t}{12}\right) dt$ can be done with the substitution $u = \frac{\pi t}{12}$ and $du =$

$$π12

✔ $\frac{\pi}{12}$ dt.

Step 5

With this substitution, the integration limits change from $t = 0$ to $u =$ 0 ✔ 0 and from $t = 12$ to $u =$

$$π

✔ π.

Step 6

$$18\int_0^{12} \sin\left(\frac{\pi t}{12}\right) dt = 18($$

$$12π

Now, ✔ $\frac{12}{\pi}$ $\int_0^{\pi} \sin(u)\, du$.

Step 7

This can be evaluated as

$$\frac{216}{\pi}\left[-\cos(u)\right]_0^{\pi} = \frac{216}{\pi}\left[2 \text{ ✔ } 2\right]$$

$$432π

$$= \quad ✔ \frac{432}{\pi}.$$

Step 8

$T_{ave} = \frac{1}{12}($

$$660+432π

$660 + \frac{432}{\pi}$) =

$$55+36π

Therefore, $55 + \frac{36}{\pi}$ °F, which to the nearest degree is approximately 66 66 °F.

You have now completed the Master It.

---

6. **3/3 points** **Previous Answers** **SCalcET8 6.5.019.** **My Notes** **Ask Your Teacher**

The linear density ρ in a rod 3 m long is $12/\sqrt{x+1}$ kg/m, where x is measured in meters from one end of the rod. Find the average density ρ_{ave} of the rod.

ρ_{ave} = 8 kg/m

7. 3/3 points Previous Answers SCalcET8 6.5.504.XP. My Notes Ask Your Teacher

Find the average value f_{ave} of the function f on the given interval.

$$f(\theta) = 5\sec^2(\theta/4), \quad [0, \pi]$$

f_{ave} =

20п

8. 3/3 points Previous Answers SCalcET8 6.5.508.XP. My Notes Ask Your Teacher

Consider the given function and the given interval.

$f(x) = 2\sqrt{x}, \quad [0, 9]$

(a) Find the average value f_{ave} of f on the given interval.

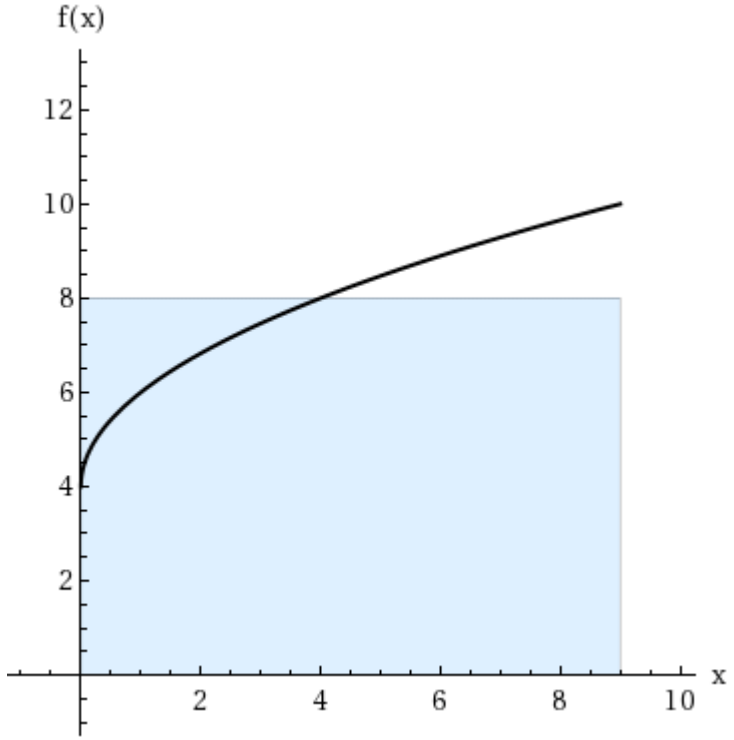
$f_{ave} =$

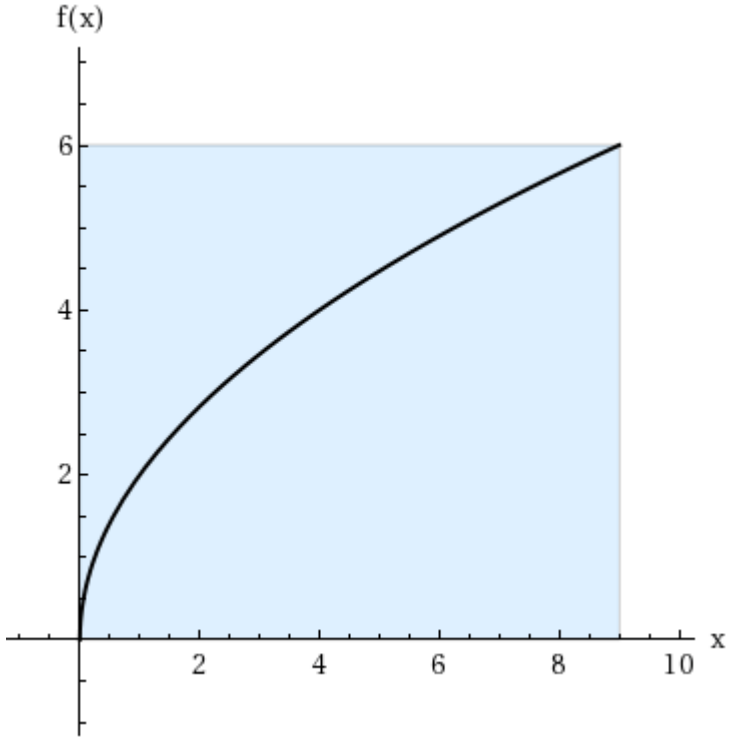
4

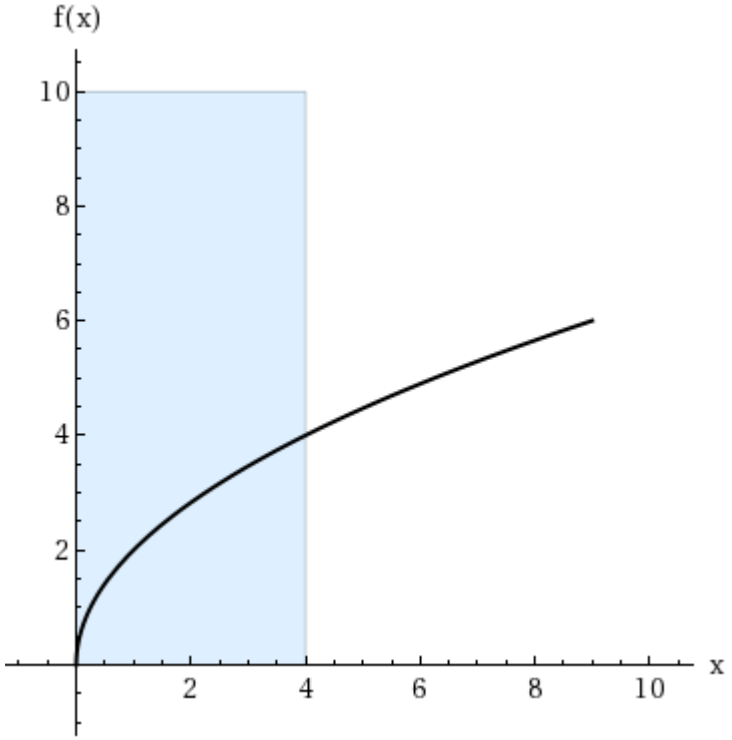
(b) Find c such that $f_{ave} = f(c)$. (Round your answer to three decimal places.)

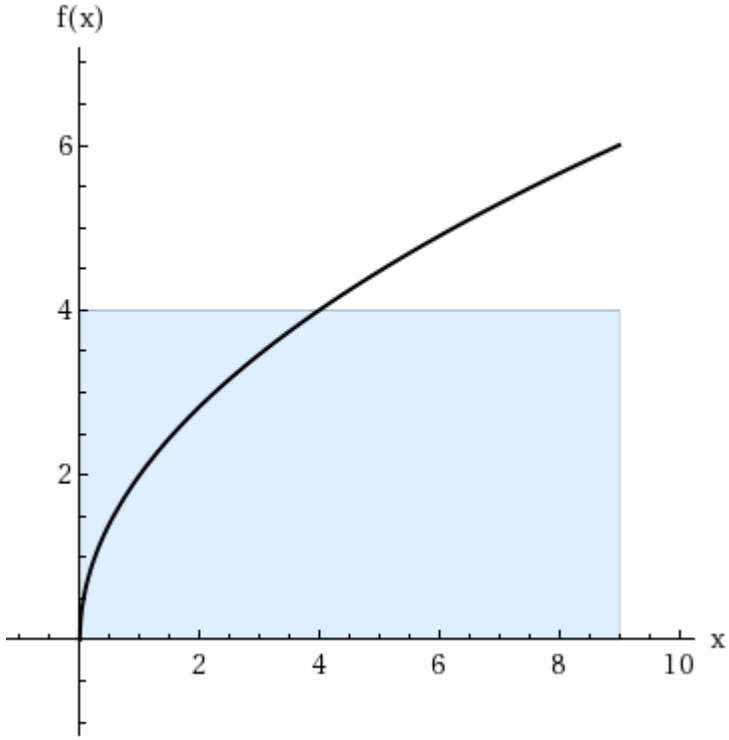
$c =$ 4

(c) Sketch the graph of f and a rectangle whose area is the same as the area under the graph of f.


f(x)
12
10
8
6
4
2
2
4
6
8
10
x


f(x)
6
4
2
2
4
6
8
10
x


f(x)
10
8
6
4
2
2
4
6
8
10
x


f(x)
6
4
2
2
4
6
8
10
x

9. 3/3 points Previous Answers SCalcET8 6.5.AE.001. My Notes Ask Your Teacher

Video Example

EXAMPLE 1 Find the average value of the function $f(x) = 1 + x^2$ on the interval $[-2, 1]$.

SOLUTION With $a = -2$ and $b = 1$, we have

$$f_{\text{ave}} = \frac{1}{b-a}\int_a^b f(x)\,dx$$

$$= \frac{1}{1 - (\boxed{-2}\ \checkmark)}\int_{-2}^{1}(1 + x^2)\,dx$$

$$= \frac{1}{3}\left[\ \boxed{}x+13x3\right.$$

$$\boxed{}\ \checkmark\ \Big]_{-2}^{1}$$

$$= \boxed{}2$$

$$\boxed{}\ \checkmark\ .$$

10. 3/3 points Previous Answers SCalcET8 6.5.AE.002. My Notes Ask Your Teacher

Video Example

EXAMPLE 2 Since $f(x) = 5 + x^2$ is continuous on the interval $[-4, 2]$, the Mean Value Theorem for Integrals says there is a number c in $[-4, 2]$ such that

$$\int_{-4}^{2} (5 + x^2)\,dx = f(c)[2 - (-4)].$$

In this particular case we can find c explicitly. Using this example, we find that $f_{ave} = 9$, so the value of c satisfies

$$f(c) = f_{ave} = 9.$$

Therefore

$5 + c^2 =$ 9 ✓

so

$c^2 =$ 4 ✓ .

So in this case there happen to be two numbers $c = \pm 2$ in the interval $[-4, 2]$ that work in the Mean Value Theorem for Integrals.

Submit Assignment Save Assignment Progress

Home My Assignments Extension Request