Section 4.2 – Riemann Sums Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. We wish to use Riemann sums to find the area under the curve $f\left(x\right)=x^{2}$ from *x = 0* to *x = 8* using the Left-Hand Side Rule (LHS) with 4 divisions.
	1. Sketch the graph *y = f(x)* and draw the rectangles you will use to approximate the area labeling *(x,y)* at the LHS of each division as well as the values of $x\_{i}$ and$ ∆x$.
	2. Fill in the following table numerically

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width | Height | Area |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |

* 1. Fill in the same table using $x\_{i}$ and$ ∆x$

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width | Height | Area |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |

* 1. Express athe approximation of the total area as a numeric sum.
	2. Express athe approximation of the total area as a symbolic sum using $x\_{i}$ and$ ∆x$.
	3. Convert the symbolic sum in part e to a Riemann Sum in the form

 $\sum\_{}^{}…∆x$.

* 1. What happens to the quality of our approximation if we use more divisions with a smaller $∆x$?
1. We wish to use Riemann sums to find the area under the curve $f\left(x\right)=x^{2}$ from *x = 0* to *x = 8* using the Midpoint Rule with 4 divisions.
	1. Sketch the graph *y = f(x)* and draw the rectangles you will use to approximate the area labeling *(x,y)* at the midpoint of each division as well as $x\_{i}$ and$ ∆x$.
	2. Fill in the following table numerically

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width | Height | Area |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |

* 1. Fill in the same table using $x\_{i}$ and$ ∆x$

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width | Height | Area |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |

* 1. Express athe approximation of the total area as a numeric sum.
	2. Express athe approximation of the total area as a symbolic sum using $x\_{i}$ and$ ∆x$.
	3. Convert the symbolic sum in part e to a Riemann Sum in the form

 $\sum\_{}^{}…∆x$.

* 1. What happens to the quality of our approximation if we use more divisions with a smaller $∆x$?
1. We wish to use Riemann sums to find the area under the curve $f\left(x\right)=\left(x-1\right)(x)(x+2)$ from *x = -2* to *x = 4* using the Midpoint Rule with 3 divisions.
2. Sketch the graph *y = f(x)* and draw the rectangles you will use to approximate the area labeling *(x,y)* at the midpoint of each division as well as $x\_{i}$ and$ ∆x$.
3. Fill in the following table numerically

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width | Height | Area |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

1. Fill in the same table using $x\_{i}$ and$ ∆x$

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width | Height | Area |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

1. Express athe approximation of the total area as a numeric sum.
2. Express athe approximation of the total area as a symbolic sum.
3. Convert the symbolic sum in part e to a Riemann Sum in the form

 $\sum\_{}^{}…∆x$.

1. What happens to the quality of our approximation if we use more divisions with a smaller $∆x$?