6.2 Volumes

1. We wish to use Riemann sums with cuboids to find the volume of a pyramid with a square base of sies = 12 m. and a height of 6 m. We will start with 3 divisions and will use the minimum height to approximate the volume of each division.
	1. Sketch the pyramid, let x= height and find the relationship between x and the length of of the square’s sides at that height.
	2. Fill in the following table numerically

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width of square | Height | Volume |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | Width of square | Height | Volume |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

* 1. Express the approximation of the total volume as a numeric sum.
	2. Express the approximation of the total volume as a symbolic sum.
	3. Convert the symbolic sum in part f to a Riemann Sum in the form $\sum\_{i=1}^{n}…∆x$
	4. Take the limit of part 4 to find an integral expression representing the precise volume. Solve this integral to find the precise volume.
1. We wish to use Riemann sums with cuboids to find the volume of a pyramid with a rectangular base of width 8, length 16 m. and height 4 m.
	1. Divisions: Sketch the pyramid, let x equal the height of the pyramid and find the relationship between x and the length and the width of the rectangle at that value.
	2. For Every division: Express the volume of the *i*th division in terms of $x\_{i}$ and$ ∆x$
	3. Sum: Express an approximation of the total volume in the form $\sum\_{i=1}^{n}…∆x$
	4. Limit: Take the limit to find an integral expression representing the precise volume. Solve this integral to find the precise volume.

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| See the source image | 1. Given the truncated pyramid to the left with  *a = 8 m*, *b = 4 m* and *h = 2 m.*  Find the volume delineating the 4 steps:
2. Divisions
3. For each division
4. Sum
5. Limit
 |

1. We wish to use Riemann sums with cylinders to find the volume of a circular cone with a base of of radius 12 m. and a height of 4 m. We will start with 2 divisions and will use the minimum height to approximate the volume of each division.
	1. Sketch the cone, let x= height and find the relationship between x and the radius of the circle at that height.
	2. Fill in the following table numerically

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | radius | Height | Volume |
| 1 |  |  |  |  |
| 2 |  |  |  |  |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Division | *x-*value used | radius | Height | Volume |
| 1 |  |  |  |  |
| 2 |  |  |  |  |

* 1. Express athe approximation of the total volume as a numeric sum.
	2. Express athe approximation of the total volume as a symbolic sum.
	3. Convert the symbolic sum in part e to a Riemann Sum in the form $\sum\_{i=1}^{n}…∆x$
	4. Take the limit of part 4 to find an integral expression representing the precise volume. Solve this integral to find the precise volume

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| --- | --- |
| See the source image | 1. Given the truncated pyramid to the left with  *l = 12 m*, w *= 6 m, l2=6 m, w2 = 3 m* and *h = 3 m.*  Find the volume delineating the 4 steps:
2. Divisions
3. For each division
4. Sum
5. Limit
 |

|  |  |
| --- | --- |
| See the source image | 1. Given the frustrum to the left with  *r = 4 m, R = 24 m* and *h = 5 m.*  Find the volume delineating the 4 steps:
2. Divisions
3. For each division
4. Sum
5. Limit
 |

|  |  |
| --- | --- |
| See the source image | 1. Optional: Given the tetrahedron to the left with the distance between all vertices equal to *6 m.* Find the volume delineating the 4 steps:
2. Divisions
3. For each division
4. Sum
5. Limit
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