Mini-math Div 3/4: Wednesday, December 3, 2025 (8.7-8.13) - 18 minutes

1. (2 points) The base of a solid is the region bounded by $y = x^{1/3}$, $y = 3$, and $x = 1$. Cross-sections perpendicular to the x-axis are rectangles whose heights are twice their base. Set up an integral (or integrals) that represents the volume of the solid.

2. (2 points) Consider the region R bounded by $y = \arctan x$, $x = -1$, and $y = 1$. Find an integral (or integrals) that represents the volume of the solid of revolution if we revolve the region R about the line $x = -1$.

3. (2 points) Set up an integral (or integrals) that represents the volume of the solid generated by revolving the region above $y = x^3$, below the line $y = 8$, and between $x = 0$ and $x = 2$ around the x-axis.

4. (2 points) Consider the region R that is bounded by $y^2 = 7x + 8$ and $y = x + 2$. If R is the base of a solid and cross-sections perpendicular to the y-axis are semi-circles, set up an integral (or integrals) that represents the volume of the solid.

5. (2 points) Let R be the region enclosed by $y = x^2 - 4$ and $y = 2x + 4$. Find an integral (or integrals) that represents the perimeter of the region R.

6. (2 points) Let R be the region in the first quadrant below $y = 4 - x^2$. Find an integral (or integrals) that represents the volume of the solid of revolution if we revolve the region R about the line $y = 4$.