Math 1431

Section 16679

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Questions?

Review

Popper 19

1. Give the equation of the tangent line to $f(x) = \arctan(x)$ at $x = 0$.

Popper 19

2. Use your answer to problem 1 to estimate arctan(.2).

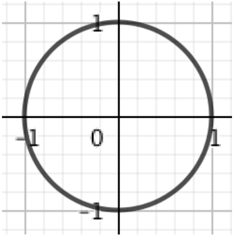
Popper 19

3. Find the maximum of $x \cdot y$ given that $3x + 2y = 6$.

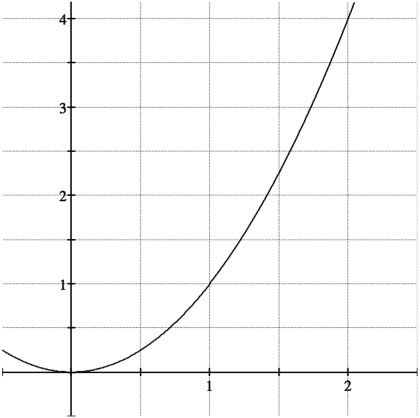
Popper 19

4. $$\lim_{x\to 0} \frac{2x}{\arctan(3x)} =$$

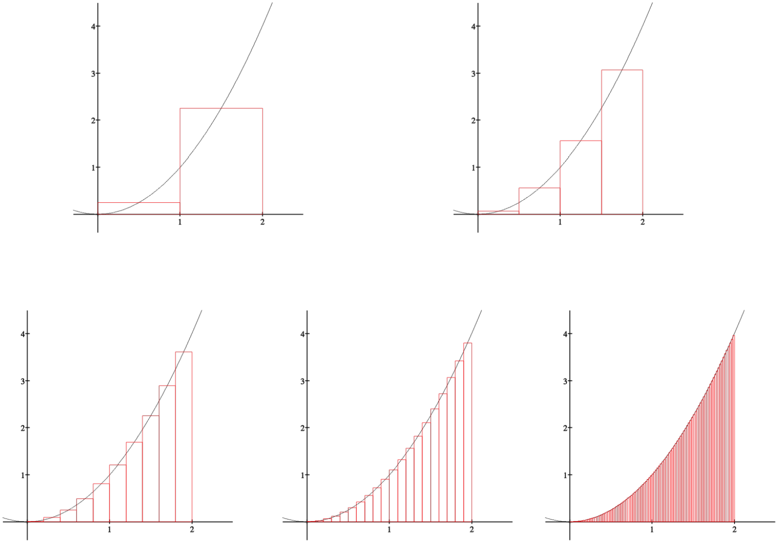
Suppose you wanted to find the area of this circle and all you knew was how to find the area of a square?



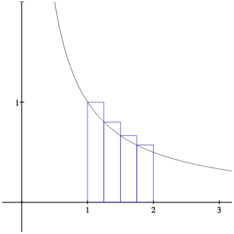
How could we find the area under the curve of $f(x) = x^2$ and above the x-axis for $x \in [0, 2]$?



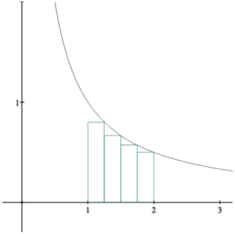
Section 6.1 -The Definite Integral



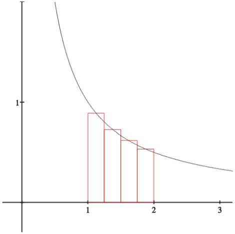
How we place our rectangles is important. We can place rectangles such that the upper left corner of each rectangle is on the curve. Suppose we are given $f(x) = \dfrac{1}{x}$ on the interval $[1, 2]$ and want four rectangles withe equal widths such that the left endpoint of each rectangle is on the curve:



Suppose we are given $f(x) = \dfrac{1}{x}$ on the interval $[1, 2]$ and want four rectangles withe equal widths such that the right endpoint of each rectangle is on the curve:



Lastly, suppose we are given $f(x) = \dfrac{1}{x}$ on the interval $[1, 2]$ and want four rectangles withe equal widths such that the midpoint of each rectangle is on the curve:

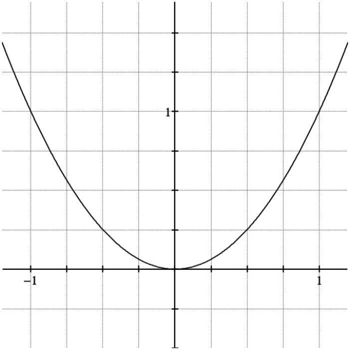


The desired "area" is the sum of the areas of the rectangles such that the number of rectangles approaches infinity. Now, we cannot find an infinite number of areas ourselves but we can estimate our answer with a finite number of rectangles. We can overestimate our answer or underestimate it depending on where we place the height of our rectangles. An **Upper Riemann Sum** over a given partition P, $U_f(P)$, is an overestimate of the area between a curve and the x-axis and a **Lower Riemann Sum**, $L_f(P)$, is an underestimate. The actual "area" is somewhere between these two.

$$L_f(P) \leq Area \leq U_f(P)$$

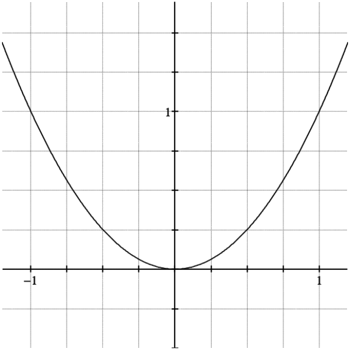
Examples:

1. Find an upper sum for $f(x) = x^2,\ x \in [-1, 1]$ if the partition is $P = \left[-1, -\frac{3}{4}, \frac{1}{4}, \frac{1}{2}, 1\right]$.



Examples:

2. Find an lower sum for $f(x) = x^2,\ x \in [-1, 1]$ if the partition is $P = \left[-1, -\frac{3}{4}, \frac{1}{4}, \frac{1}{2}, 1\right]$.



Popper 19

5. $\dfrac{d}{dx}(\arcsin(3x)) =$

To Do

Review sections 3.6-5.3.

Work your review and take the PT.