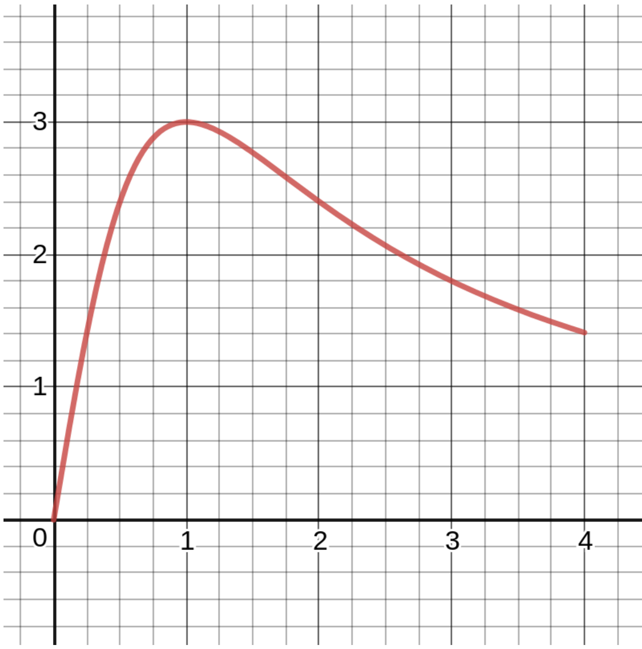
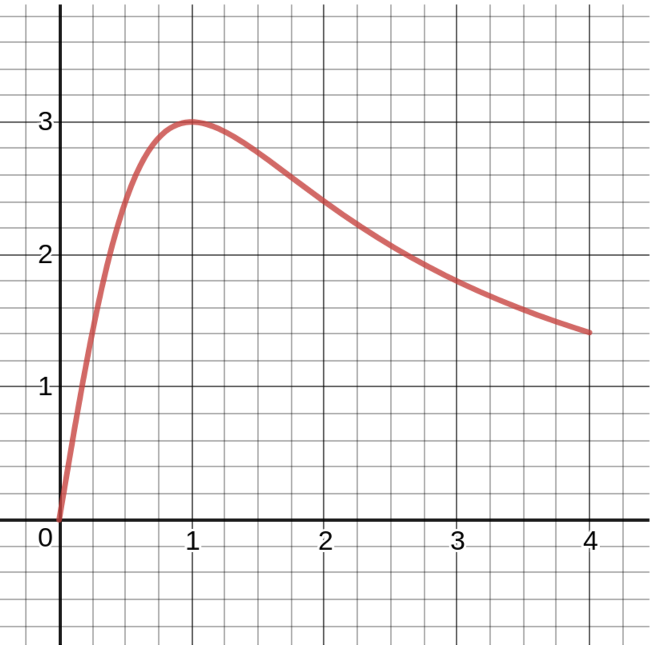
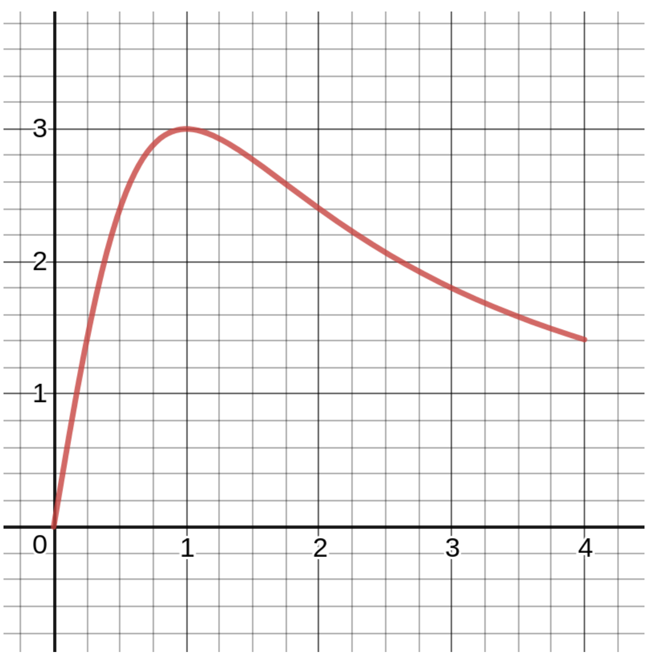
Name: Section: 5 6 (circle one) Score: /10 HW 22 - Due: 10/29

Problem 1

Below are 3 graphs of the function $f(x) = \frac{6x}{x^2+1}$. On the graphs draw the rectangles associated to the right hand, left hand, and midpoint Riemann Sum approximations using 4 rectangles with uniform width. After you draw the rectangles, compute the Riemann Sum approximation for each.







Problem 2

In this problem, we find the area between the graph of $f(x) = x^2$ and the x-axis over the interval $[0, 3]$ by taking a limit of right hand approximations of Riemann Sums. You can follow my prescribed steps (if you missed class, or maybe forgot/didn't understand what we did) if you want. They are to guide you through the process, without solving the problem for you. You don't have to follow my steps if you don't want to, but you **can't** use any "integral" based solutions.

a) The interval $[0, 3]$ is divided into n equal parts. How big is each part?

b) Draw the interval $[0, 3]$ and draw how you've divided into n parts (with little tick marks). The first tick should be at $x = \frac{3}{n}$ (note: this is a big hint for part *a*)). Where will the second tick be? Third? What about the k-th tick? Label these on the interval.

c) Now draw the graph over the prescribed interval and the approximating n rectangles, note that you won't be able to actually draw all of them because you don't know what n is. What is the height of the k-th rectangle?

d) Express the combined area of the rectangles as a sum in sigma notation.

e) Use the fact that $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$ to re-write the sum from problem *d*) without any sigma notation.

f) Now take your answer from *e*) and find the $\lim_{n\to\infty}$. Your answer should be 9 (the exact area of the region). Do a dance... because you've conquered infinity yet again!