**Problem statement** Suppose that $a$ is a positive constant and that $R$ is the region bounded above by $y = 1/x^a$, below by $y = 0$, and on the left by the line $x = 1$.

a) Sketch the curves $y = 1/x^a$ for $a = .5$, 1 and 2. Which of these is closest to the $x$-axis?

b) For which positive numbers $a$ do you get a convergent integral when you attempt to calculate the area of $R$?

c) Same as b), but for the volume of the solid obtained by rotating $R$ around the $x$-axis.

d) Same as c), but for the volume of the solid obtained by rotating $R$ around the $y$-axis.