

1. Improper Integrals

(a) Evaluate $\int_0^{\infty} x e^{-x^2} dx$.

(b) Explain (using words and pictures) how you can use part (a) to determine whether $\int_0^{\infty} e^{-x^2} dx$ converges.

2. Geometric Series

(a) Draw a picture to show that the series

$$1 + \frac{1}{2} + \frac{1}{2^2} + \dots + \frac{1}{2^n} + \dots$$

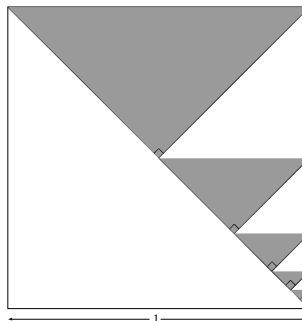
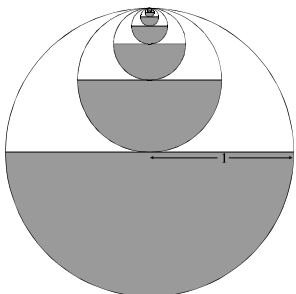
converges.

(b) Show how to find $S_n = \sum_{k=0}^n ar^k$

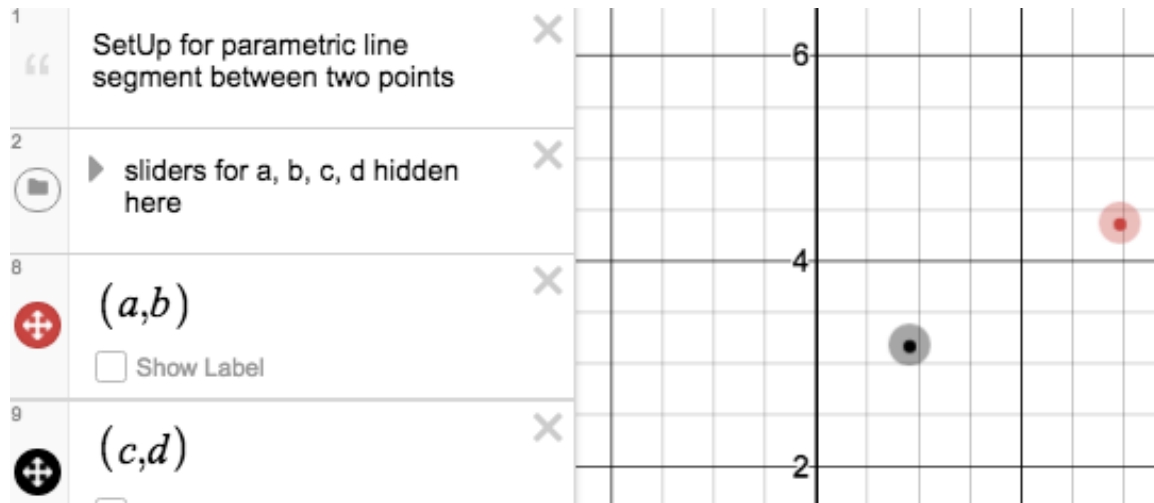
(c) Under what conditions will the sequence $\{S_n\}$ converge as $n \rightarrow \infty$?

3. A rubber ball rebounds to two-thirds the height from which it falls. If it is dropped from a height of four feet and is allowed to continue bouncing indefinitely, what is the total distance it travels?

4. Compute the sum of the shaded areas for each figure.



5. A parametric line segment



- Given points (a, b) and (c, d) as well as a parameter $t \in [0, 1]$, write a parametric equations for $x(t)$ and $y(t)$ that gives the line segment between the two points.
- Put your equations together in the form $(x(t), y(t))$ that is used by Desmos.
- Go to the Calculus page of tetrahedra.net. At the top of *Places to Visit* click the link for Desmos setup for parametric line segment and test your work.

6. Work on Cowculus.