

Mathematics 1120H – Calculus II: Integrals and Series

TRENT UNIVERSITY, Summer 2020

Quiz #5

Tuesday, 21 July.

Available on Blackboard from 12:01 a.m. on Tuesday, 21 July.

Due on Blackboard by 11:59 p.m. on Tuesday, 21 July.

Solutions will be posted on Thursday, 23 July.

Scans of photos of handwritten work are entirely acceptable so long as they are legible and in some common format; solutions submitted as a single pdf are preferred, if you can manage it. If you can't submit your solutions via Blackboard's Assignments module for some reason, please email them to the instructor at: sbilaniuk@trentu.ca

Reminder: Per the course outline, all work submitted for credit must be written up entirely by yourself, giving due credit to all relevant sources of help and information. For the quizzes, you are permitted to use your textbook and all other course material, but you may not use any other sources or aids, nor give or receive any help, except to ask the instructor to clarify questions and to use a calculator (any that you like).

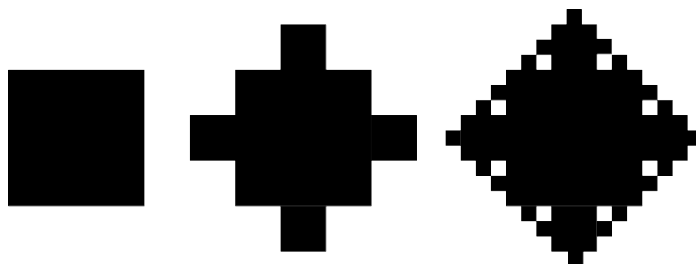
We will construct a two-dimensional shape as follows:

At stage 0 we take a unit square, *i.e.* one with sides of length 1.

At stage 1, we attach a square with sides of length $\frac{1}{3}$ to the middle of each side of the unit square.

At stage 2, we attach a square with sides of length $\frac{1}{9}$ to the middle of each side of the shape obtained in stage 1.

Here are the shapes we have at stages 0, 1, and 2, respectively:



In general, at stage $n + 1$, we attach a square with sides $(\frac{1}{3})^{n+1}$ to the middle of each side of the shape obtained at stage n .

Consider the object that you would have at the end of this (infinite!) process.

1. What should the length of the border of the limit object be? [2]
2. What should the area of the limit object be? [2.5]
3. What shape is the limit object very close to being? [0.5]