

Problem Set 10

[Your name] and [student ID]
MAT1801-2020

Problem 1 (10 points). Let X be a finite set of points in some Euclidean space and let $r \geq 0$. Prove that $VR(X, r) \subset Cech(X, \sqrt{2}r)$.

Problem 2 (10 points). If K is a p -dimensional simplicial complex and for each k , n_k is the number of k -simplices in K , the Euler number of K is given by

$$\chi(K) = \sum_{k=0}^p (-1)^k n_k.$$

Show that any two triangulations of the circle S^1 have the same Euler number.

Problem 3 (10 points). Construct a simplicial complex with $\beta_2 = 3$, $\beta_1 = 2$, $\beta_0 = 1$. Prove your construction is correct.