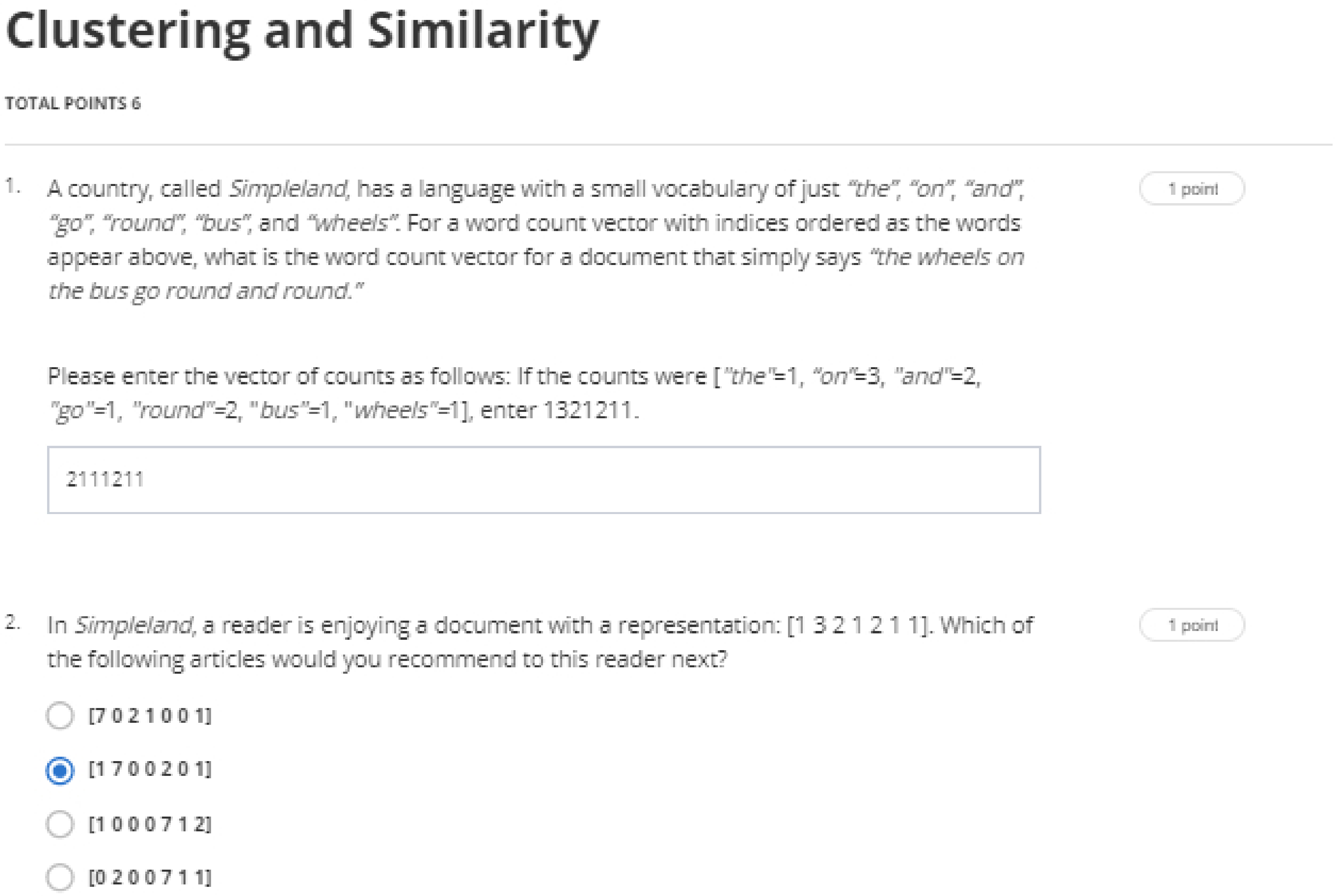


Clustering and Similarity

TOTAL POINTS 6

1. A country, called *Simpleland*, has a language with a small vocabulary of just *"the"*, *"on"*, *"and"*, *"go"*, *"round"*, *"bus"*, and *"wheels"*. For a word count vector with indices ordered as the words appear above, what is the word count vector for a document that simply says *"the wheels on the bus go round and round."*

   1 point

   Please enter the vector of counts as follows: If the counts were [*"the"*=1, *"on"*=3, *"and"*=2, *"go"*=1, *"round"*=2, "*bus*"=1, "*wheels*"=1], enter 1321211.

   2111211

2. In *Simpleland*, a reader is enjoying a document with a representation: [1 3 2 1 2 1 1]. Which of the following articles would you recommend to this reader next?

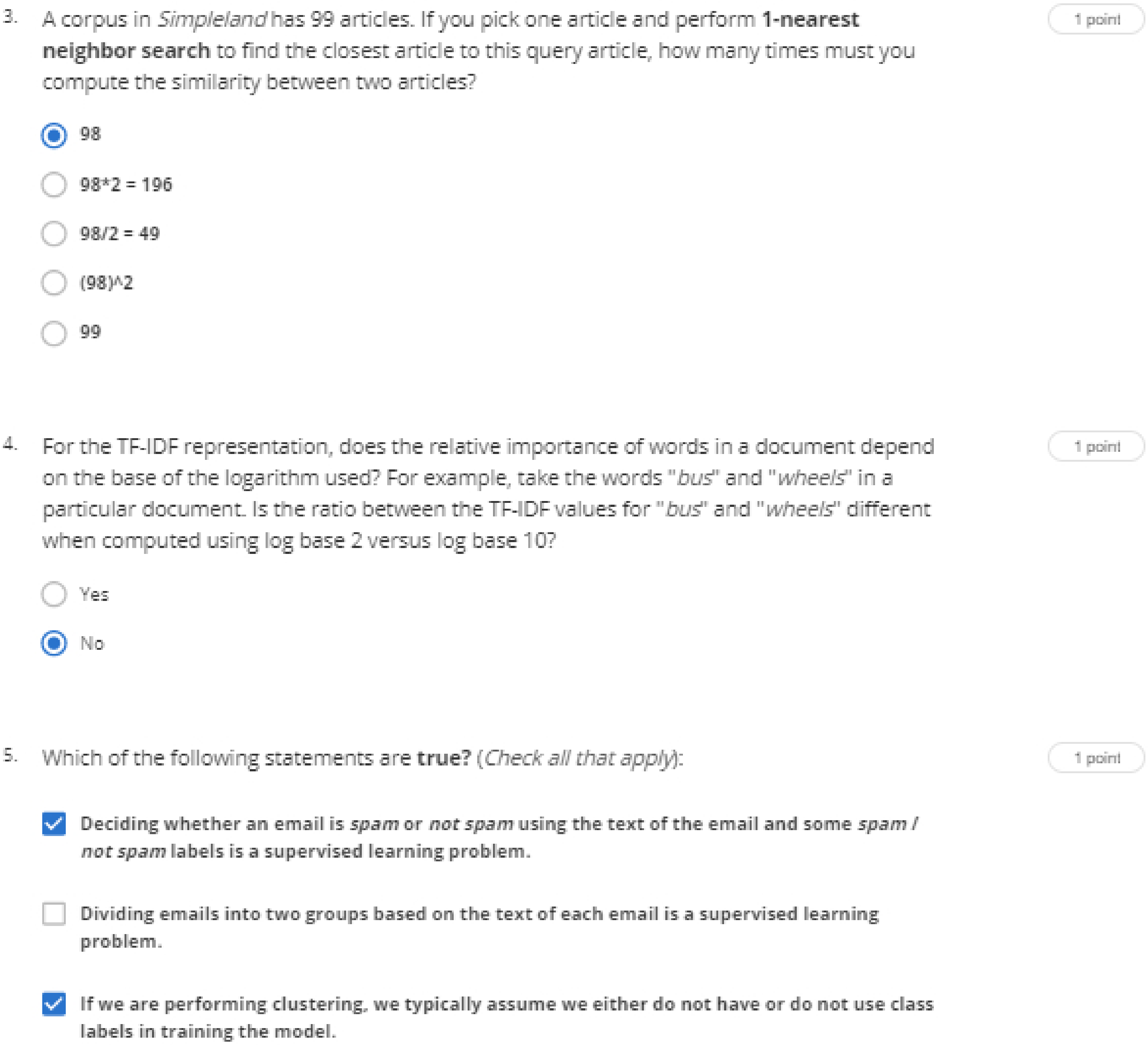
   1 point

   ○ [7 0 2 1 0 0 1]

   ● [1 7 0 0 2 0 1]

   ○ [1 0 0 0 7 1 2]

   ○ [0 2 0 0 7 1 1]



3. A corpus in *Simpleland* has 99 articles. If you pick one article and perform **1-nearest neighbor search** to find the closest article to this query article, how many times must you compute the similarity between two articles?

1 point

● 98

○ 98*2 = 196

○ 98/2 = 49

○ (98)^2

○ 99

4. For the TF-IDF representation, does the relative importance of words in a document depend on the base of the logarithm used? For example, take the words "*bus*" and "*wheels*" in a particular document. Is the ratio between the TF-IDF values for "*bus*" and "*wheels*" different when computed using log base 2 versus log base 10?

1 point

○ Yes

● No

5. Which of the following statements are **true?** (*Check all that apply*):

1 point

☑ Deciding whether an email is *spam* or *not spam* using the text of the email and some *spam / not spam* labels is a supervised learning problem.

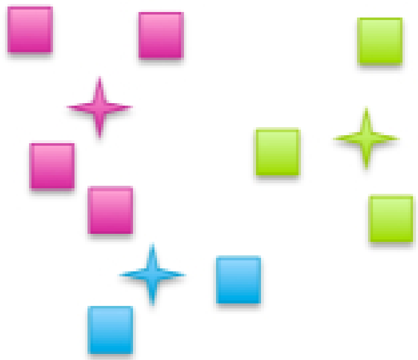
□ Dividing emails into two groups based on the text of each email is a supervised learning problem.

☑ If we are performing clustering, we typically assume we either do not have or do not use class labels in training the model.

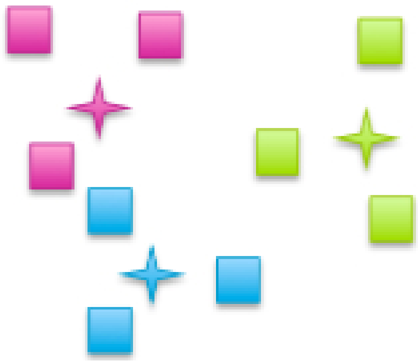
6. Which of the following pictures represents the ***best*** k-means solution? (*Squares represent observations, plus signs are cluster centers, and colors indicate assignments of observations to cluster centers.*)

1 point

○



●



○