1. Which of the following is a segmentation task? **1 point**

- (●) Determining which areas of the brain have tumor from an MRI
- ( ) Determining whether a brain tumor is present in an MRI
- ( ) None of the above
- ( ) Determining whether there is a mass in a chest X-ray

2. What is the MAIN disadvantage of processing each MRI slice independently using a 2D segmentation model (as mentioned in the lecture)? **1 point**

Hint: watch the lecture video "Segmentation" to help you answer this question.

- ( ) It is difficult to register slices of MRI models
- ( ) You lose some context between slices
- ( ) 3D models are always better than 2D models
- ( ) None of the above

3. The U-net consists of... **1 point**

- ( ) Just a contracting path
- ( ) A contracting path followed by an expanding path
- ( ) An expanding path followed by a contracting path
- ( ) Just an expanding path

4. Which of the following data augmentation is most effective for MRI sequences? **1 point**

- ( ) Shuffling the slices
- ( ) Shifting each pixel to the right by a constant amount with wrap around
- ( ) Rotation
- ( ) Randomly shuffle the pixels in each slice

5. What is the soft dice loss for the example below? **1 point**

$$L(P, G) = 1 - \frac{2\sum_{i=1}^{n} p_i g_i}{\sum_{i=1}^{n} p_i^2 + \sum_{i=1}^{n} g_i^2}$$

P

0.3	0.7	0.3
0.7	0.9	0.7
0.3	0.7	0.3

G

0	1	0
1	1	1
0	1	0

- ○ 0.089
- ○ 0.910
- ○ 0.544
- ○ -0.089

6. Look at the output of model 1 and model 2: **1 point**

P1

0.3	0.7	0.3
0.7	0.9	0.7
0.3	0.7	0.3

P2

0.5	0.7	0.5
0.7	0.9	0.7
0.5	0.7	0.5

G

0	1	0
1	1	1
0	1	0

Which one will have a lower soft dice loss?

Hint: Notice the prediction scores of P1 and P2 on the pixels where the ground truth is 1. This may help you focus on certain parts of the soft dice loss formula:

$$L(P, G) = 1 - \frac{2\sum_{i=1}^{n} p_i g_i}{\sum_{i=1}^{n} p_i^2 + \sum_{i=1}^{n} g_i^2}$$

- They will be the same
- Model 2 has a smaller loss
- None of the above
- Model 1 has a lower loss

7. What is the minimum value of the soft dice loss? **1 point**

$$L(P, G) = 1 - \frac{2\sum_{i=1}^{n} p_i g_i}{\sum_{i=1}^{n} p_i^2 + \sum_{i=1}^{n} g_i^2}$$

- 0
- 4
- - infinity
- 1

8. An X-ray classification model is developed on data from US hospitals and is later tested on an external dataset from Latin America. Which if the following do you expect? **1 point**

- None of the above
- Performance remains unchanged
- Performance improves on the new dataset
- Performance drops on the new dataset

9. Which of the following is an example of a prospective study? **1 point**

- A model is trained and tested on a dataset of X-rays collected between 2001 and 2010
- None of the above
- A model is deployed for 1 year in an emergency room and its performance over that time is evaluated

- A model is trained on data collected between 2001 and 2010 and then validated on data collected between 2011 and 2013