EECS 442 F17 Quiz 7 11/09 Jason J. Corso, jjcorso@umich.edu

Name:

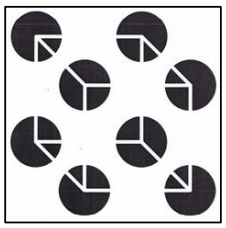
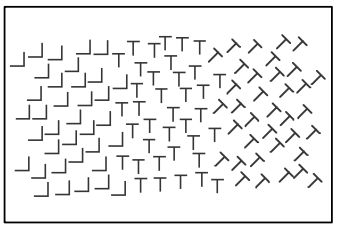
UNIQNAME#:

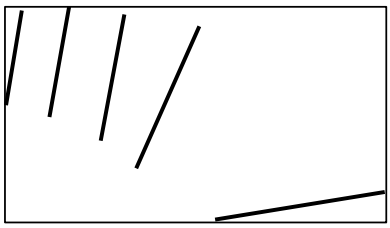
4	3	3	10

Directions – *The quiz is closed book/notes. You have 10 minutes to complete it; use this paper only.*

Problem 1: Recall/Comprehension (4 pts) (Match)

Match the images below with the Gestalt term that describes it, by writing which of these terms it is: closure, common-fate, composition, continuance, figure-ground equivocation, and grouping. Note that two terms is not used.



_____ _____ _____ _____

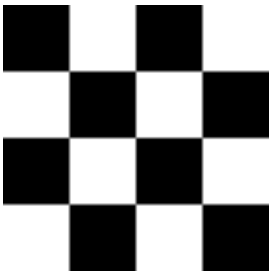
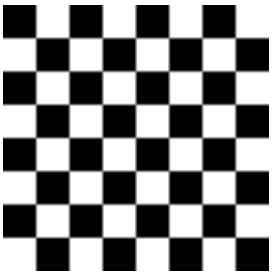
Solution:

closure; grouping; equivocation; continuance.

Problem 2: Comprehension (3 pts) (Compare)

Recall the piecewise constant Mumford-Shah model. Consider a solution $\hat{f}$ shown on the left, and two possible input images f_1 and f_2 on the right, against which this $\hat{f}$ could have originated from. Rank the $E(\hat{f}, \partial)$ for the two input images as less-than, greater-than, or equal. Assume values of the constants in $E(\hat{f}, \partial)$ are all 1.

In other words, is $E(\hat{f}, \partial; f_1)$ less-than, greater-than, or equal-to $E(\hat{f}, \partial; f_2)$? _____

$\hat{f}$ Solution f_1 Image 1 f_2 Image 2

Solution:

Equal-to.

$E(\hat{f}, \partial; f) = \sum(\hat{f} - f)^2 + \sum(\nabla \hat{f})^2 + \partial \hat{f}$. The boundary condition plays no role here because it is computed on $\hat{f}$ and not the input images.

Problem 3: Comprehension (3 pts) (Work)

We have an image I of size 2×3. Pixels are indexed from 1 to 6, as shown below on the left. We can construct a graph from I, whose vertices correspond to the pixels. Now, fill the values of the adjacency matrix (the grid on the right) of this graph. You should consider 4-neighbor connectivity here.

1	2	3
4	5	6

Solution:

The adjacency matrix should be symmetric with diagonal all 0s.

	1	2	3	4	5	6
1		1		1		
2	1		1		1	
3		1				1
4	1				1	
5		1		1		1
6			1		1	

3 points for correct answer
-1 if not symmetric
-1 if the values filled in are partially correct