Computer Vision - Exam 2017

1. Missing what parameters can you reconstruct structure up what transformation.
2. A whole question on how to express points using Transformation matrix. (3 camera and relationship between them - also homogeneous coordinates)
3. SLIC vs Mean Shift
4. KNN vs Kmean
5. Given one image each for 4 specific objects, you have a test image, how do you classify the test image. Come up with an algorithm and explain the steps. Hint: use feature correspondence
6. Why use ml algo instead of heuristic for classifying number digits (MNIST)
7. State 4 gestalt ways of grouping
8. Is Shape Context scale and translation invariant?
9. How to make Shape Context rotation invariant?
10. Difference between unsupervise, interactive and semantic segmentation
11. Given points and initial clusters simulate KMeans alg step by step.
12. When does Implicit Shape model fail?
13. Describe Shape Context procedure to classify images.
14. What's computationally demanding with R-CNN? How to make it faster?
15. What's the main reason for boosting to use weak classifier?
16. Given a graph of kernel function and list of points, calculate MeanShift clusters.
17. Describe all parameters of K (camera) matrix and sketch a picture what they mean.
18. How many degrees of freedom does P projection matrix have?
19. Given images of class A and B. Half of class A samples has vector [0,1,0,1] and the other [1,0,1,0]. Half of class B samples has vector [1,1,0,0] and the other half [0,0,1,1]. Can Naive Bayes classifier classify these images? Assume same prior.
20. Given Epipolar matrix E = $\begin{bmatrix} 0 & -T_z & T_y \\ T_z & 0 & -T_x \\ -T_y & T_x & 0 \end{bmatrix}$, and points P=[px,py,1], Q=[qx,qy,1]. For T=[0,0,1], are lines corresponding to P and Q in the other image parallel?
    a. Same question for T=[1,1,0].
    b. What needs to hold for vector T for the lines to be parallel?