

Midterm review: Cameras

- Pinhole cameras
- Vanishing points, horizon line
- Perspective projection equation, weak perspective
- Lenses
- Human eye

- Sample question: “What property must 3D lines have so that they converge to the same vanishing point in an image? Assume standard perspective projection.”

Midterm review: Filters

- Convolution
- Box filters, Gaussian filters, derivatives
- Separable filters
- Aliasing, Gaussian pyramids, template matching
- Sample question: “What does the following 3x3 linear filter compute when applied to an image?”

0	0	0
-2	0	2
0	0	0

Midterm review: Edges and Corners

- Derivative of Gaussian, image gradients
 - Edges at different scales
 - Canny edge detector
 - Harris corner detector
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- Sample question: “Why is non-maximum suppression applied in the Canny edge detector?”

Midterm review: Texture

- Texture representation
- Laplacian pyramid, oriented pyramid
- Texture matching
- Texture synthesis (details of homework)

- Sample question: “Why does the top-most image in a Laplacian pyramid differ from the others?”

Midterm review: Stereo Vision

- Epipolar constraint, image rectification
- Ordering and brightness constancy constraints
- Normalization of image patches
- Window size
- Dynamic programming approach

- Sample question: “Under what conditions is the ordering constraint violated in stereo matching?”

Midterm review: Segmentation

- Gestalt properties
- Agglomerative clustering, dendrogram
- K-Means clustering (EM details not required)
- Background subtraction

- Sample question: “The simplest method for background subtraction is to just subtract the pixels in one frame from the previous one. Why do many systems instead try to build a model of the background from extended image sequences?”

Midterm review: Fitting a Model

- Hough transform
 - RANSAC
 - Inliers vs. outliers, iterative fitting
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- Sample question: “Explain the factors that determine what size of bin to use in the Hough transform?”