

Oral Exam Questions - Wil Brady (2006)

Combinatorics (Ward)

Define a partition. What can you say about the number of partitions of n ?
Generating function? Asymptotics?

AI (Saul)

What is conditional independence? Can you give an example of conditional independence and an example where it fails?

How is this represented in a directed acyclic graph? Can you draw all DAGs that represent $P(x, y|z) = P(x|z)P(y|z)$?

What can you say about using Gaussian's in a belief network? Draw a distribution of a Gaussian and define the probability function. (Then Pemantle started up with a bunch of probability questions.) What are some nice properties of Gaussians?

Combinatorics (Pemantle)

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Combinatorics (Ward)

Define an order ideal. What are the order ideals of the fence poset (fence poset goes up, down, up, down,... - like a zig zag)? What is the generating function for the number of order ideals of the fence poset? What is the generating function for the number of total orderings of the fence poset? (Pemantle asked that last question.)

AI (Saul)

Define what the margin is with respect to the decision plane. Draw several decision planes and explain why we would want to maximize the margin? Give the perceptron learning algorithm.

Combinatorics (Pemantle)

Step through the varying levels of evaluating the integral $A(z) \exp(-\lambda\phi(z))$ on γ .

Suppose you had $a_{r,s} = a_{r-1,s} +$ some more similar terms. What can you say about the generating function. What about the diagonal - does a similar kind recurrence (p -recursive) exist for the diagonal terms? What is the generating function for the above recurrence relation?