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Lek-Heng Lim and **Jose Israel Rodriguez***, George Herbert Jones Laboratory, 5747 S. Ellis Ave, Chicago, IL 60637. *Factoring graphs, matrices, and polynomials as tensor products.*

The tensor or Kronecker product of two matrices is well-known. The tensor product of two graphs is one whose adjacency matrix is given by the tensor product of the adjacency matrices of the respective graphs. The tensor product of two (univariate) polynomials is one whose companion matrix is given by the tensor product of the companion matrices of the respective polynomials. These tensor products are category-theoretic products in the respective categories. We discuss how graphs, matrices, and polynomials may be factored into irreducible factors with respect to these tensor products. We use the Newton–Girard formulas and homotopy continuation to find the decomposition. This is joint work with Lek-Heng Lim. (Received February 19, 2018)