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Paul H Drube* (pdrube@math.uiowa.edu), Department of Mathematics, The University of Iowa, Iowa City, IA 52242. *Which invariants of surfaces come from TQFT?*

Associated with every two-dimensional TQFT is a field-valued diffeomorphism invariant of closed, oriented two-manifolds, which we interpret as a map f whose domain is the counting numbers and whose range is the field over which the TQFT is defined. We precisely characterize which maps f may be realized as the diffeomorphism invariant of a 2-D TQFT Z . Intimately related to this characterization is the question of whether the Frobenius algebra A that a TQFT Z assigns the circle is equivalent to a quotient the algebra of all 2-D surfaces having the circle as their boundary, where the quotient is by the subspace of surfaces that "evaluate similarly". This nice property actually fails for a large class of TQFTs, including ones with both semisimple and non-semisimple associated Frobenius algebra. We precisely characterize the class of TQFTs satisfying this property, and demonstrate that the set of functions f arising from such TQFTs have a particularly succinct description. (Received August 16, 2010)