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Anna Varvak* (avarvak@soka.edu). *A proof of differential identities using lattice path encodings.*

One-dimensional lattice paths, such as Dyck paths, Motzkin paths, and more generally Łukasiewicz paths, encode combinatorial objects, such as fixed-point-free involutions, involutions, and permutations. We use these encodings in a combinatorial proof of a family of differential operator identities:

$$\exp\left(y\left(\frac{d}{dx} + f(x)\right)\right) = \exp\left(\int_0^y f(t+x) dt\right) \exp\left(y\frac{d}{dx}\right),$$

for any power series $f(x)$ with real coefficients. An algebraic proof of these identities can be found in R. P. Stanley's "Differential posets" (1988). (Received September 22, 2005)