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*An Integral Representation for the Fibonacci Numbers and Their Generalization,*

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**Abstract**

We report on an integral representation for the Fibonacci sequence

$$F_n = \frac{1}{\sqrt{5}} \left( \frac{\sqrt{5} + 1}{2} \right)^n - \frac{2}{\pi} \int_0^\infty \frac{\sin(x/2) \cos(nx) - 2 \sin(nx) \sin x}{x (5 \sin^2 x + \cos^2 x)} dx$$

and give two different proofs, with or without invoking complex analysis. These proofs allow us to present some generalizations of this integral representation along two different directions.