Class 2: Definition of Beta function and its properties

1. Prove that $\beta(n,n)=\frac{1}{2^{2n-1}}\beta\left(n,\frac{1}{2}\right)$
2. Prove that $\int_0^1 \frac{xdx}{\sqrt{1+x^4}}=\frac{1}{5}\beta\left(\frac{2}{5},\frac{1}{2}\right)$
3. Show that $\beta(m,n)=\int_0^1 \frac{x^{m-1}+x^{n-1}}{(1+x)^{m+n}}dx$

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