

Math 202-LM. Extra Credit.

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1 A Tricky Integral

Evaluate the integral

$$\int x^3(\sqrt{1-x^2})^5 dx.$$

2 A Limit of Sums

Let

$$s_n = \frac{1}{\sqrt{n}\sqrt{n+1}} + \frac{1}{\sqrt{n}\sqrt{n+2}} + \frac{1}{\sqrt{n}\sqrt{n+3}} + \dots + \frac{1}{\sqrt{n}\sqrt{n+n}}.$$

Find $\lim_{n \rightarrow \infty} s_n$.