Worksheet 1

Claudiu Raicu

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Evaluate the following indefinite integrals. Check your answers!

1. $\int \cos(x)e^{\sin(x)}dx$
2. $\int t^3e^{-t^2}dt$
3. $\int_0^1 \sqrt{1-x^2}dx$

Prove the reduction formula

4. $\int x^m(1-x)^n dx = \frac{x^{m+1}(1-x)^n}{m+1} + \frac{n}{m+1}\int x^{m+1}(1-x)^{n-1}dx$

4'. Evaluate $\int_0^1 x^m(1-x)^n dx$

Evaluate

5. $\int_0^\pi \sin^2(t)\cos^4(t)dt.$
6. $\int \sec^2(x)\tan(x)dx.$
7. $\int (\tan^2(x)+\tan^4(x))dx.$
8. If m and n are positive integers, show that

$$\int_{-\pi}^{\pi} \sin(mx)\cos(nx)dx = 0.$$