Math 76 Assessment 6 §3.2 Trigonometric Integrals

Things to remember:

1. The problem to complete is shown below. Write your name and solution on the next page where instructed.
2. Please make sure your full name is written neatly in the box.
3. Your score will be determined by **Mechanics** (2 points) and by **Content** (3 points).
4. The following rubric will be used for **Mechanics**:

Clear neat work, steps in order and easily followed, proper use of notation	2
Mostly clear work; minor errors in notation or skipped steps	1.5
Steps/handwriting hard to follow/read; major errors in notation	1
No discernible or relevant work, or work impossible to read/follow	0

5. You are not allowed to consult outside sources, including notes, books, the internet, or other people, while taking this assessment. Calculators are allowed only for basic numerical or scientific computations, not for graphing or algebra.
6. If you need more room, you may finish on a plain piece of paper or blank document.
7. When you are finished, create a legible, well-lit **.pdf file** of your work and upload it to Assessment 6 on Gradescope. Please follow the directions to **assign the page(s)** of your submission that contain your work for the question. More info about submitting to Gradescope:

`http://bit.ly/gradescope-help`

Evaluate the integral on the next page. Your solution should include:

- (0.5 point) Statement of strategy to be used;
- (1 point) Explanation and steps showing use of strategy, including any trigonometric identities or u-substitutions used;
- (0.5 point) Correct evaluation of integral;
- (1 point; 0 if no relevant work/explanation) Correct final answer in terms of x and n.

You may or may not find the following identities useful:

- $\sin^2 x + \cos^2 x = 1$
- $\cos^2 x = \frac{1}{2}(1 + \cos(2x))$
- $\sin^2 x = \frac{1}{2}(1 - \cos(2x))$
- $\sin(2x) = 2\sin x \cos x$

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Version D

Follow the directions on the previous page. Assume n is an unknown number greater than or equal to 2. Evaluate the integral

$$\int \sin^n x \cos^5 x \, dx.$$

$$\int \sin^n x \cos^5 x \, dx.$$

$\cos^2(x) = 1 - \sin^2 x$

$$= \int \sin^n x \cos^4 x \cos x \, dx$$

$$= \int \sin^n x (1-\sin^2 x)(1-\sin^2 x)\cos x \, dx$$

$u = \sin x$
$du = \cos x$

$$= \int u^n (1-u^2)(1-u^2)\, du$$

$$= \int (u^n - u^{n+2})(1-u^2)\, du$$

$$= \int u^n - u^{n+2} - u^{n+2} + u^{n+4}\, du$$

$$= \frac{u^{n+1}}{n+1} - \frac{2u^{n+3}}{n+3} + \frac{u^{n+5}}{n+5} + c$$

$$= \frac{\sin x^{n+1}}{n+1} - \frac{2\sin^{n+3}}{n+3} + \frac{\sin^{n+5}}{n+5} + c \quad \surd$$