

MTH 122 — Calculus II  
Essex County College — Division of Mathematics and Physics<sup>1</sup>  
Project #1 — Sakai Web Project Material

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

The following question is worth ten points total, and will be added to your quiz grades. Only correct answers will be accepted. Due date will be announce in class.<sup>2</sup>

Evaluate<sup>3</sup>

$$\int \frac{1}{x^7 - x} dx.$$

**Work:** Taking the hint and using  $u = x^6$ .

$$u = x^6 \quad \Rightarrow \quad du = 6x^5 dx$$

Here's goes.

$$\begin{aligned} \int \frac{1}{x^7 - x} dx &= \int \frac{1}{x(x^6 - 1)} dx \\ &= \frac{1}{6} \int \frac{6x^5}{x^6(x^6 - 1)} dx \\ &= \frac{1}{6} \int \frac{1}{u(u - 1)} du \\ &= \frac{1}{6} \int \frac{1}{u - 1} - \frac{1}{u} du \\ &= \frac{1}{6} [\ln |u - 1| - \ln |u|] + C \\ &= \boxed{\frac{1}{6} \ln \left| \frac{x^6 - 1}{x^6} \right| + C} \end{aligned}$$

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<sup>1</sup>This document was prepared by Ron Bannon ([ron.bannon@mathography.org](mailto:ron.bannon@mathography.org)) using L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>. Last revised February 13, 2009.

<sup>2</sup>Project questions are assigned on occasion, and have strict due dates that must be adhered to.

<sup>3</sup>The straightforward approach would be to start with partial fractions, but that would be *brutal*. **Hint:** Try a substitution, I used  $u = ?$  and it worked like a *charm*.