

MAT126, Paper Homework “Oil”

Due in recitation between 9/19 and 9/23

Answer both questions below. To get full credit, you must **justify your answers**; just writing an answer, even if correct, will not earn full points.

1. A large tank of canola oil ruptures at a time $t = 0$ minutes, and the oil leaks out at a rate of $r(t) = 100e^{-0.01t}$ liters per minute (t is in minutes). How much oil leaks out within the first hour?

2. Prove that it is always true that for any positive real numbers a and b ,

$$\int_0^1 x^a(1-x)^b dx = \int_0^1 x^b(1-x)^a dx .$$

HINT: make a substitution to transform one integral into the other. Do **not** try to compute the integrals.