

Quiz for August 21, 2009 – 9:05 section

Remove everything from your desk except this page and a pencil or pen.

Circle your answer. **Show your work.**

The quiz is worth 5 points.

Compute $\int_0^1 \frac{y^2 dy}{\sqrt{4-3y}}$.

Answer: We do a change of variables. Suppose that the expression under the radical was just a variable, then we could do algebraic tricks to finish the problem! We make it so! Let $u = 4 - 3y$. It follows that $du = -3dy$. Notice that when $x = 0$, then $u = 4$; and when $x = 1$, then $u = 1$. The original problem is equal to

$$\begin{aligned} \int_4^1 \frac{\left(\frac{4-u}{3}\right)^2 du}{-3\sqrt{u}} &= \frac{1}{-27} \int_4^1 \frac{(4-u)^2 du}{\sqrt{u}} \\ &= \frac{1}{-27} \int_4^1 \frac{(16 - 8u + u^2) du}{\sqrt{u}} = \frac{1}{-27} \int_4^1 (16u^{-1/2} - 8u^{1/2} + u^{3/2}) du \\ &= \frac{1}{-27} \left(16u^{1/2} \Big|_4^1 - 8u^{3/2} \Big|_4^1 + u^{5/2} \Big|_4^1 \right) = \boxed{\frac{32 - \frac{16}{3} + \frac{2}{5} - (16 \cdot 4 - \frac{8 \cdot 8 \cdot 2}{3} + \frac{64}{5})}{-27}} \end{aligned}$$