

MAC2312: Calculus 2 - Section 3

Quiz 5: 7.6 Integration Using Tables and CAS

June 2, 2015

1. Use the formula

$$\int \sqrt{2au - u^2} \, du = \frac{u - a}{2} \sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$$

to evaluate $\int \sqrt{x - x^2} \, dx$.

A. $\frac{2x-1}{4} \sqrt{x - x^2} + \frac{1}{8} \cos^{-1} (1 - 2x) + C$

B. $\frac{x-1}{2} \sqrt{x - x^2} + \frac{1}{2} \cos^{-1} (1 - x) + C$

C. $\frac{x-2}{2} \sqrt{x - x^2} + 2 \cos^{-1} \left(\frac{2-x}{2} \right) + C$

D. $\frac{4x-1}{8} \sqrt{x - x^2} + \frac{1}{32} \cos^{-1} \left(\frac{4-x}{4} \right) + C$

$$\begin{aligned} \int \sqrt{x - x^2} \, dx &= \int \sqrt{2au - u^2} \, du & \left[\begin{array}{ll} u = x & a = 1/2 \\ du = dx & \end{array} \right] \\ &= \frac{u - a}{2} \sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C \\ &= \frac{x - 1/2}{2} \sqrt{x - x^2} + \frac{(1/2)^2}{2} \cos^{-1} \left(\frac{1/2 - x}{1/2} \right) + C \\ &= \frac{2x - 1}{4} \sqrt{x - x^2} + \frac{1}{8} \cos^{-1} (1 - 2x) + C \end{aligned}$$