

Quiz 2 — 09/07/17

Name: _____ Section and/or TA: _____

Answer all questions in a clear and concise manner. Unsupported answers will receive *no credit*.

1. (3 points) Find $\int \sqrt{4 - x^2} dx$

Solution: Let $x = 2 \sin \theta$, then $dx = 2 \cos \theta$ and

$$\begin{aligned}\int \sqrt{4 - x^2} dx &= \int \sqrt{4 - 4 \sin^2 \theta} (2 \cos \theta d\theta) \\ &= \int 4 \cos^2 \theta d\theta = \int 4 \frac{1 + \cos 2\theta}{2} d\theta \\ &= 2\theta + \sin 2\theta + C = 2\theta + 2 \sin \theta \cos \theta + C \\ &= 2 \arcsin \frac{x}{2} + \frac{x\sqrt{4 - x^2}}{2} + C\end{aligned}$$

2. (2 points) Find $\int \cos^3 2x dx$. Show your work!

Solution:

$$\int \cos^3 2x dx = \int (1 - \sin^2 2x) \cos 2x dx$$

Let $u = \sin 2x$, then $du = 2 \cos 2x dx$, so

$$\begin{aligned}&= \frac{1}{2} \int (1 - u^2) du = \frac{1}{2} u - \frac{1}{6} u^3 + C \\ &= \frac{1}{2} \sin 2x - \frac{1}{6} \sin^3 2x + C\end{aligned}$$