PRINT Your Name:_____

There are 11 problems on 5 pages. Problem 1 is worth 10 points. Each of the other problems is worth problem is worth 9 points. SHOW your work. $\boxed{CIRCLE}$ your answer. **NO CALCULATORS!** CHECK your answer whenever possible.

1. Find $\int \cos^5 x \, dx$. CHECK your answer.

$$= \int (1 - \sin^2 x)^2 \cos x \, dx \underset{\uparrow}{=} \int (1-u^2)^2 \, du = \int (1 - 2u^2 + u^4) \, du$$

$$u = \sin x$$
$$du = \cos x \, dx$$

$$= u - \frac{2u^3}{3} + \frac{u^5}{5} + C = \boxed{\sin x - \frac{2\sin^3 x}{3} + \frac{\sin^5 x}{5} + C}$$

$\checkmark \quad \frac{d}{dx}(RA) = \cos x - 2\sin^2 x \cos x + \sin^4 x \cos x$

$\qquad = \cos x (1 - 2\sin^2 x + \sin^4 x)$

$\qquad = \cos x (1 - \sin^2 x)^2 \quad \checkmark$

2. Find $\int \cos^4 x \, dx = \frac{1}{4} \int (1 + \cos 2x)^2 \, dx = \frac{1}{4} \int (1 + 2\cos x + \cos^2 2x) \, dx$

$= \frac{1}{4} \int 1 + 2\cos 2x + \frac{1}{2}(1 + \cos 4x) \, dx = \boxed{\frac{1}{4}\left(\frac{3}{2}x + \sin 2x + \frac{\sin 4x}{8}\right) + C}$