PRINT Your Name:____________________

Quiz 2 — January 24, 2014 – Section 8 – 10:50 – 11:40

Remove everything from your desk except this page and a pencil or pen.
The solution will be posted soon after the quiz is given.

$\boxed{\text{Circle}}$ your answer. **Show your work. Your work must be correct and coherent.**
The quiz is worth 5 points.

Find $\int_0^\pi \sin^4(3t)\,dt$.

Answer: We use the double angle formula $\sin^2\theta = \frac{1}{2}(1-\cos 2\theta)$ to see that

$$\int_0^\pi \sin^4(3t)\,dt = \frac{1}{4}\int_0^\pi (1-\cos(6t))^2\,dt = \frac{1}{4}\int_0^\pi (1-2\cos(6t)+\cos^2(6t))\,dt.$$

We use the double angle formula $\cos^2\theta = \frac{1}{2}(1+\cos 2\theta)$ to obtain that the most recent integral is

$$= \tfrac{1}{4}\textstyle\int_0^\pi (1-2\cos(6t)+\tfrac{1}{2}(1+\cos(12t)))\,dt = \tfrac{1}{4}\int_0^\pi (\tfrac{3}{2}-2\cos(6t)+\tfrac{1}{2}\cos(12t))\,dt$$

$$= \tfrac{1}{4}(\tfrac{3}{2}t - 2\tfrac{\sin(6t)}{6} + \tfrac{1}{2}\tfrac{\sin(12t)}{12})\Big|_0^\pi = \boxed{\frac{3\pi}{8}}$$