

Physics 451- Fall 2012

Homework # 5

Due Friday, Sep 14, by 7pm

Please place your assignment in the "Physics 451" slot across from N373 ESC.
We will have help sessions twice a week, in N337 ESC (undergraduate lab):
T Th from 3 to 6 pm

List of problems (from the textbook):

2.4

2.5

2.7

2.8

Hints:

Useful integrals for problem **2.4**:

$$\int \sin^2(\alpha x) dx = \left[\frac{x}{2} - \frac{\sin(2\alpha x)}{4\alpha} \right]$$

$$\int x \sin^2(\alpha x) dx = \left[\frac{x^2}{4} - \frac{x \sin(2\alpha x)}{4\alpha} - \frac{\cos(2\alpha x)}{8\alpha^2} \right]$$

$$\int x^2 \sin^2(\alpha x) dx = \left[\frac{x^3}{6} - \frac{x \cos(2\alpha x)}{4\alpha^2} - \left(\frac{x^2}{4\alpha} - \frac{1}{8\alpha^3} \right) \sin(2\alpha x) \right]$$

Useful integral for problem **2.5**

$$\int x \sin(\alpha x) \sin(\beta x) dx = \frac{1}{2} \left[\frac{\cos[(\alpha - \beta)x]}{(\alpha - \beta)^2} - \frac{\cos[(\alpha + \beta)x]}{(\alpha + \beta)^2} + x \frac{\sin[(\alpha - \beta)x]}{(\alpha - \beta)} - x \frac{\sin[(\alpha + \beta)x]}{(\alpha + \beta)} \right]$$

Useful integrals for problem **2.7**

$$\int x \sin(\alpha x) dx = \left[\frac{\sin(\alpha x)}{\alpha^2} - \frac{x \cos(\alpha x)}{\alpha} \right]$$

$$\sum_{n=0}^{\infty} \frac{1}{(2n+1)^2} = \frac{\pi^2}{8}$$