

Materials Science and Engineering 405
Prof. Mark C. Hersam, Fall 2006
PHYSICS OF SOLIDS

Homework #1

Due: Monday, October 2, 2006

- 1.) **(15 points)** Griffiths, Problem 1.7
- 2.) **(15 points)** Griffiths, Problem 1.18
- 3.) **(25 points)** Griffiths, Problem 2.5

For this problem, the following equations may be helpful:

$$\begin{aligned}\sin A \sin B &= \frac{1}{2}(\cos(A - B) - \cos(A + B)) \\ \int x \sin^2(ax) dx &= \frac{x^2}{4} - \frac{x \sin 2ax}{4a} - \frac{\cos 2ax}{8a^2} \\ \int x \cos(ax) dx &= \frac{\cos ax}{a^2} + \frac{x \sin ax}{a}\end{aligned}$$

- 4.) **(10 points)** Griffiths, Problem 2.14

For this problem, the following equation may be helpful:

$$\int_{-\infty}^{\infty} e^{-ax^2} dx = \sqrt{\frac{\pi}{a}}$$

- 5.) **(35 points)** Griffiths, Problem 2.22

For this problem, the following equations may be helpful:

$$\text{If } \operatorname{Re}\{u\} > 0, \int_{-\infty}^{\infty} e^{-ux^2} e^{vx} dx = \sqrt{\frac{\pi}{u}} e^{v^2/4u}; \int_{-\infty}^{\infty} x^2 e^{-ux^2} dx = \frac{\sqrt{\pi}}{2u^{3/2}}$$