Phys 3810, Spring 2011
Problem Set #2

1. *Griffiths*, **2.37**

2. *Griffiths*, **2.10**

3. *Griffiths*, **2.11**

4. *Griffiths*, **2.15**

5. *Griffiths*, **2.19**

6. *Griffiths*, **2.21**

7. Using Maple or the computer–math system of your choice, plot the square of the wave function for the 50^{th} stationary state of the QM harmonic oscillator.

We'll use Eq. (2.85) of course, but if all we want is the appearance of the graph (to get a picture like Fig. (2.7) in the book) we don't need a specific m and ω because we can use the unitless variable ξ. We also don't need to worry about the normalization. So we just need to use the terms of (2.85) which depend on ξ. With these, the plot needs to go from about $\xi = -20$ to $\xi = 20$. (You decide how to show it the best.)

Recall in Maple to define a function, do (like):

```
f(x) := 4*x^3+ 3*x^2 -8;
```

The Hermite polynomials are available in Maple with the function

```
HermiteH(n, x)
```

And to plot your defined function $f(x)$, do like:

```
plot(f(x), x=-10..10);
```

Let's show Griffiths that he's not such a tough guy with his impressive-looking Fig. (2.7). You may want to try the 100^{th} state, and... hell, get the 1000^{th} state!

Note, for all integrals on this set you can use tables or Maple or whatever. But you *should* say where you got some non-obvious result, e.g. a reference number in a table of integrals if you looked it up.

The Gaussian integrals given in the inside back cover of the book come up quite a bit! You don't need to reference those.