1. Chapter 5, Problem 5-3. Hints: For this problem, apply the normalization condition to explicitly evaluate the value of the normalization factor for the wavefunction. Your result for the normalization factor should look like Equation 5.4.2 for $n = 2$, but you must evaluate this yourself. To get started, first check the recursion relation for $n = 2$.

2. Chapter 5, Problem 5-5

3. Chapter 5, Problem 5-6. Hint: We did a similar problem in class for the ground state.

4. Chapter 5, Problem 5-16

5. (a) Use the raising and lowering operators, $A^+$ and $A^-$, plus the following:

$$A^+ \Psi_n = i \sqrt{n+1} \Psi_{n+1}$$
$$A^- \Psi_n = -i \sqrt{n} \Psi_{n-1}$$
$$p_{op} = \frac{\alpha \hbar}{\sqrt{2}} (A^+ + A^-)$$
$$x_{op} = -i \frac{\sqrt{2\alpha}}{2} (A^+ - A^-)$$

and orthogonality to show that $\langle x \rangle = \langle p \rangle = 0$.

(b) Now do: Problem 5-17 in Chapter 5. Hint: Recall, in class we used the raising and lowering operators to evaluate an expression for $\langle x^2 \rangle$. Use the same procedure to evaluate an expression for $\langle p^2 \rangle$. You will also need to use the result of $\langle x^2 \rangle$ and part (a) to find the answer to the second part of problem 5-17.