Problem 1.

(a) Illustrate the operation of radix sort on the following list of English words: RUTS, TOPS, SUNS, SPOT, TONS, OPTS, TORS, SOTS, ROOT, OUTS, SUPS, PUTT

(b) Write an English sentence using both "tor" and "sot" (that indicates you understand the meanings of both words). (Do NOT write two sentences. Do NOT define the words. Do NOT pass GO. Do NOT collect $200.)

Problem 2. Assume that you execute bucket sort on n items (with n buckets), where the algorithm sorts each bucket using bubble sort.

(a) Assume that exactly one bucket has one element, exactly one bucket has two elements, exactly one bucket has three elements, etc., until you run out of elements. Calculate the number of comparisons that bucket sort uses in this situation. Get the *exact high order term*. You may assume n is nice.

(b) Assume that exactly 1 bucket has one element, exactly 2 buckets have two elements, exactly 4 buckets have three elements, exactly 8 buckets have four elements, exactly 16 buckets have five elements, exactly 32 buckets have six elements, etc., until you run out of elements. Calculate the number of comparisons that bucket sort uses in this situation. Get the answer in *Theta notation* (i.e., get the order right). You may assume n is nice.

For this part (Part(b)), you may find it helpful to look up sums (on Wolfram Alpha, for example). You may also find it helpful to approximate a sum by an integral. If you do so, do not worry about the details (with the endpoints). Just do it. You may look up the integral. Note that everything will simplify easily if you only care about the order of the answer.