Chapter 2 Problem Overview

I just went through every problem from the 2.1, 2.2, 2.3(part 1), and 2.3 (part 2) homework again. There are only three things we are doing, over and over and over again in these problems.
On the next page, I have organized <u>ALL</u> the major problems from homework into three categories.
But first, let me say a few general things:

If you missed my overview on Wednesday in lecture, then here is how to approach the problems:

STEP 1: Find all related functions. You will have to use the 2.2 functional notation skills!

STEP 2: Make a rough sketch. If the question involves a parabola or line, make a rough sketch (does the parabola open upward or downward?).

STEP 3: Translate the question:
(a) Is it just asking you to evaluate.
(b) Is it asking about the shape/vertex?
(c) Is it asking about solving/quad form?

STEP 4: Check your work! Correctly interpret your work and input your answer. (You might want to reread the original question.

If you are struggling with getting correct answers on the 2.1, 2.2, or 2.3 homework assignment, then the issue is typically one of these:

a) **Incorrectly translating the question**: I hope this sheet (see the next page) helps you organize your thinking. We really should be able to quickly identify what the question is asking at this point, you have had lots of practice.

b) **Errors in calculation or careless math**: Be organized and write out your steps. Keep **all** your digits until the end of the problem. In class and in review sheets, I have tried to model good behaviors in doing your work. We are doing the same things over and over again, so you need to build a way to be organized and you need to learn how to check your work wherever possible. Remember, you can always check your quadratic formula calculations by putting your final answers into the original question and seeing if they satisfy the equation (so you should know you are correct before you ever even submit into webassign!!!).

c) **Answering the question**: Perhaps the most common error I am seeing is students not answering the given question. For example, if the question asks for "the *price* gives maximum revenue", then you find the quantity that maximized revenue, but at the end you need to find the corresponding *price*! You must read the question and make sure you are doing what it says. Another mistakes has been not using the correct variable (sometimes students are randomly changing the variable, the problem says "t", but they are using "x") or students are incorrectly rounding (if it asks to round to two digits then 345.55555… should round to 345.56, I have seen several students enter 345.55 which is not to the nearest two digits!)

PROBLEM TYPE 1: **Solving an equation**. Most equations we saw in these problems were quadratic so you had to use the quadratic formula (get one side to zero; carefully put your numbers into the quadratic formula, keeping all your digits until the end; then correctly interpret your answer). There were a few that weren't quadratic, they were just linear, in which case you can quickly solve by getting the variable by itself.

"Find the break even points" (For this one you are solving Profit = 0 or TR = TC)
"Find q when AC = 21.50"
"Find q when AR = 16"
"Find q when MR exceeds MC by 6.25" (as we said in class, you are solving MR = MC + 6.25)
"Find when g(x) – f(x) = 4"
"Find when the graphs of g(x) and f(x) cross" (solve g(x) = f(x)).
"Find a range of quantities when AVC ≤ 0.55" (first solve AVC = 0.55)
"Find a range of quantities when VC ≤ TR" (first solve VC = TR)
"Find the largest quantity when Profit is nonnegative." (you want Profit ≥ 0, so first solve Profit = 0).
"Find when g(x) ≥ 15" (first solve g(x) = 15)
"Find when MR = MC"
"Find the y-value of AC when AC = MC (i.e. find BEP)"
(solve AC = MC, then plug *x* into AC to get the y-value)

PROBLEM TYPE 2: **Finding a vertex (or studying the shape of a function).** Write out the function and draw a sketch. If it's a quadratic then find the x-coordinate of the vertex. Then read the question and get the desired value from the x you just found.

"Find the maximum TR" (find the x-coord of the vertex of TR; compute TR at this *x*)
"Find the quantity when profit is maximum (find the x-coord of the vertex and stop)
"Find the maximum profit" (find the x-coord of the vertex of Profit; compute Profit at this *x*)
"Find the price that corresponds to the maximum profit"
(find the x-coord of vertex of Profit; compute the *price* at this *x*)
"Find the smallest y-value of AVC (i.e. find SDP)"
(find the x-coord of the vertex of AVC; compute AVC at this *x*)
"Find the interval when g(x) – f(x) is increasing"
(find the g(x)-f(x) function, sketch the graph, find the vertex)
"Find the interval when both f(x) and g(x) are increasing"
(sketch f(x), find its vertex. And sketch g(x), find its vertex; when do these intervals overlap)
"Find the interval when both TR and Profit are increasing"
(sketch TR, find its vertex. And sketch Profit, find its vertex; when do these intervals overlap)

PROBLEM TYPE 3: **Use definitions and functional notation.** At the beginning of several of the problems you needed to use functional notation to get one function from another. We spend all day in lecture on Monday talking about how to use functional notation, if you missed that, then get the notes from a classmate or check out the 2.2 review sheet. Here is the translation (and then you would use the notation correct):

"Find the formulas for MR" (TR(q+"one item")-TR(q))/"one item"
"Find the formula for MC" (TC(q+"one item")-TC(q))/"one item"
"Find the formula for TR" TR(q) = (price)(quantity) = (price) q
"Find the formula for TC" TC(q) = VC(q) + FC and TC(q) = q AC(q)
"Find the formula for VC" VC(q) = TC(q) – FC and VC(q) = q AVC(q)
"Find the formula for AC" AC(q) = TC(q)/q
"Find the formula for AVC" AVC(q) = VC(q)/q
"Find the formula for VC" VC(q) = TC(q) - FC
"Find the formula for ATS" ATS(t) = D(t) / t
"Find the formula for the average speed from t to t+5" AS(t) = (D(t+5)-D(t)) / 5
"Find the formula for the average speed from t to t+2" AS(t) = (D(t+2)-D(t)) / 2
"Find (f(x+h) – f(x))/h"