Econ 3410 FINAL SPRING 2020 Professor Rones

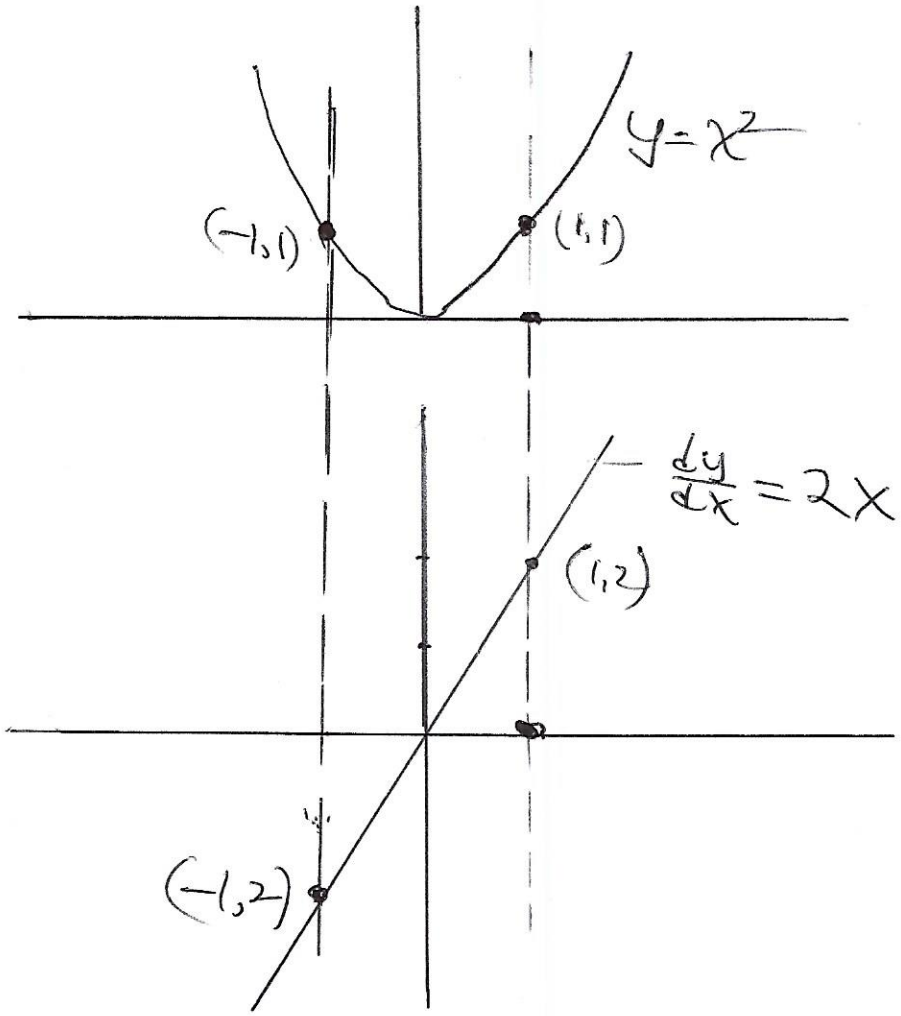
Do as much as you can. Don't get bogged down on any one problem. Show all work. Follow the instructions!

1) $y = -x^3 + 8x^2 - 5x + 3$

a) Graph "y". Be sure to label all maximum and minimum points and intercepts.

b) Graph the slope of "y" directly below "y". Line up the graphs so that the "x" values of the two graphs coincide.

Here is an example of what your graphs should look like for the function $y = x^2$. (This is just an example, NOT what you are supposed to graph.)



2) $y = (2x^3 - 8x)^4$

Find dy/dx when $x = -\frac{1}{2}$

3) A monopolist sells a product in two separate markets at different prices; i.e., he price discriminates. The demand curves in these markets are:

$P_A = 100 - Q_A$ and $P_B = 60 - 0.5\,Q_B$

His average cost function (ATC) is: $ATC = Q + 100/Q$ where $Q = Q_A + Q_B$

In your calculations, let π be defined as profit.

(Hint: Find an equation for π. Then replace Q with $Q_A + Q_B$. Then, maximize with respect to Q_A and Q_B.)

a) Use **Cramer's Rule to** find the profit maximizing quantities Q_A^* **and** Q_B^*.
(If you absolutely do not remember Cramer's rule, do it any way you can.)

You do NOT have to check second derivative conditions for a maximum.

b) Find the maximum profit, π^*

c) Find $ATC^*(Q)$ where $Q^* = Q_A^* + Q_B^*$

d) Graph the solution, as we did in HW6. You should have two graphs of demand curves and one graph of cost curves. The following page has a sample set of graphs that you can use as a guide, with all labels and coordinates missing.

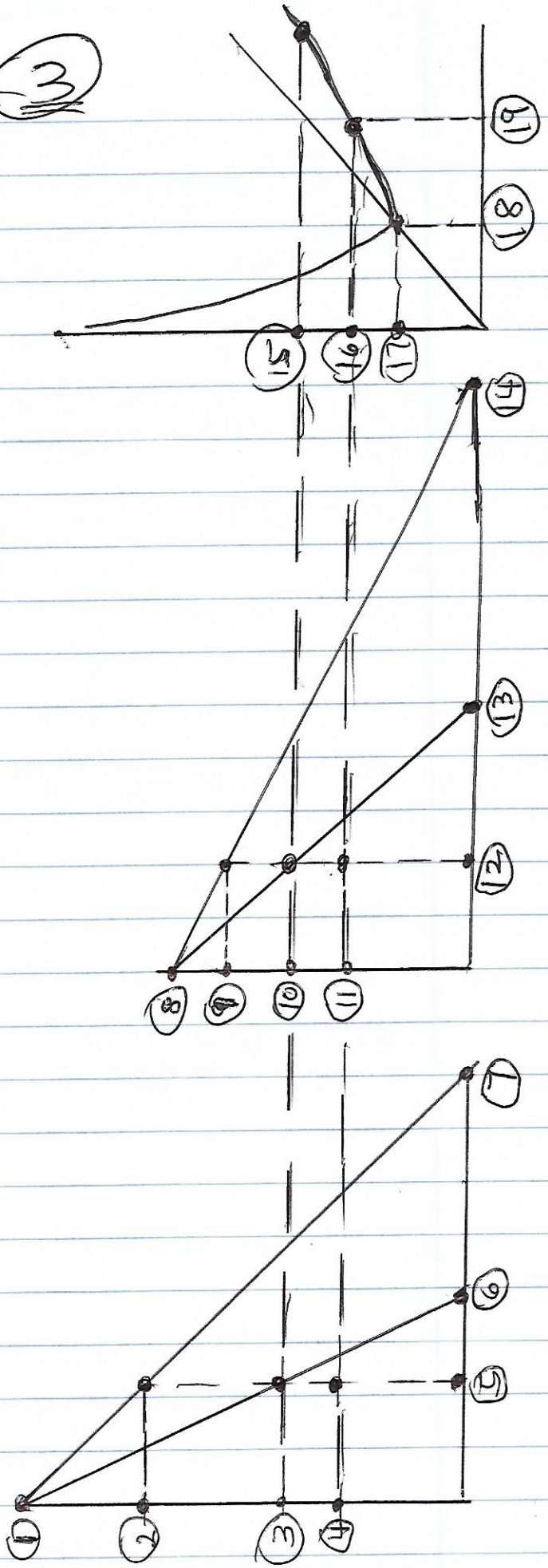
Label the curves and lines in each graph. On the sample, I have labeled 19 points with plain numbers. Replace these numbers with the values from your solution. NOTICE that the graphs line up horizontally. For example, numbers 4, 11, and 16 should have the same value. Similarly, 3, 10, and 15 should have the same value.

Show the profit in each market on the graphs. (It is a rectangle.)

Calculate the profit in each market (show your calculations) and verify that it equals π^*

PAGE 3

1. LABEL ALL CURVES
2. SUPPLY VALUES FOR EACH OF THE NUMBERED POINTS



PLEASE SUPPLY VALUES FOR EACH OF THE NUMBERED POINTS.

LABEL ALL CURVES

e) Extra Credit

How does this problem differ from the one we solved in HW6? (Besides from the fact that we are using two demand curves in the present problem, while we used three in HW6. This is NOT the answer.)

In particular, **how does the ATC function in this problem make the solution more "simultaneous" than the ATC function in HW6.**

In case you forgot, in HW6, the ATC function was **ATC = 20/Q + 15**, and the demand curves were $P_1 = 63 - 4Q_1$ $P_2 = 105 - 5Q_2$ and $P_3 = 75 - 6Q_3$