

MAT 127: Calculus C, Fall 2009

Mini-Quiz:

qualitative properties of 1st-order differential equations

DO NOT TURN THIS PAGE OVER YET

This mini-quiz is for **practice only**. It will not be graded or even collected.

On the next page, you will find two matching problems involving differential equations and diagrams of solution curves and direction fields; for one of them you will need the textbook. A problem on the final exam will contain two diagrams of each type for matching with 4 differential equations, thus being a mixture of the two problems on the next page.

You have **15 minutes** to complete both problems (not each!) on the next page. Please take **6-9 minutes** for the first problem before starting on the second and do not look at the first problem after that.

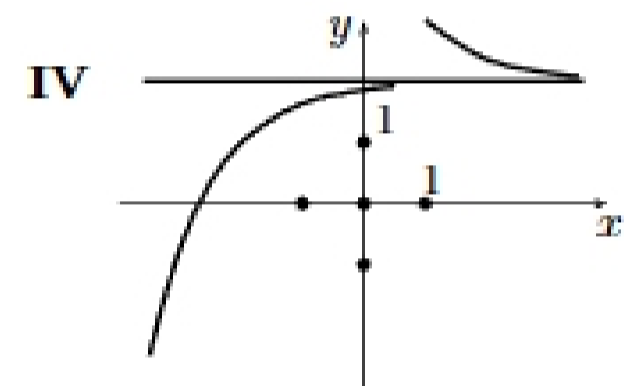
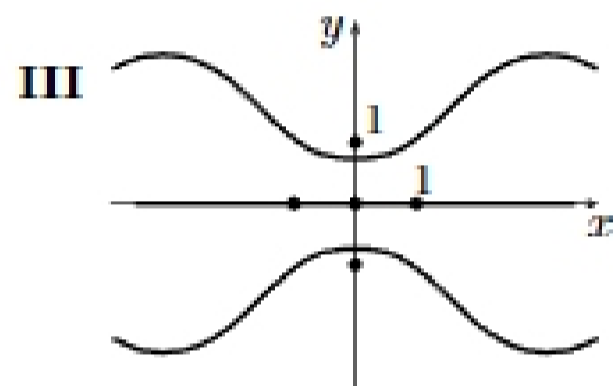
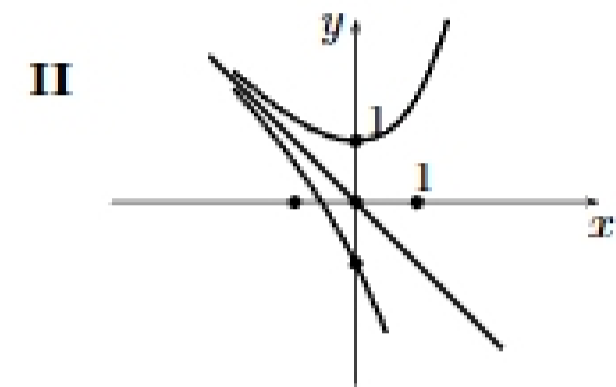
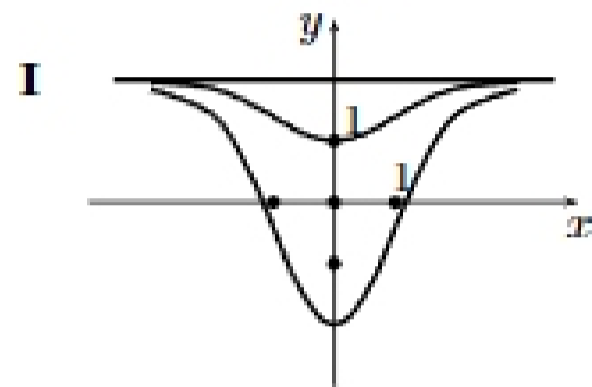
Taking about 20 minutes on the analogous problem on the final should be ok (this would be one point per minute, which is what you need to average). Thus, you are being asked to complete the mini-quiz at about 2.5 times the pace needed for the final exam; this is because you do not have 7 other problems to deal with and are under less pressure. However, please do not rush through the analogous problem on the final.

Problem A

Consider the four differential equations for $y = y(x)$:

(a) $y' = 2 - y$, (b) $y' = x(2 - y)$, (c) $y' = x + y - 1$ (d) $y' = \sin x \sin y$.

Each of the four diagrams below shows three solution curves for one of these equations:



Match each of the diagrams to the corresponding differential equation (the match is one-to-one) and explain your reasoning:

| | | | | |
|----------|---|----|-----|----|
| diagram | I | II | III | IV |
| equation | | | | |