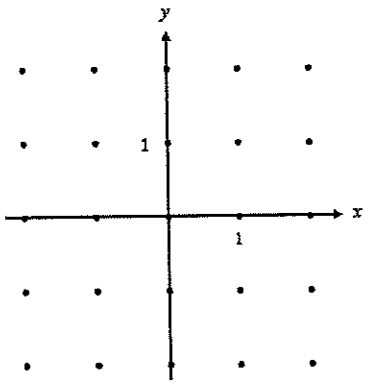
Lesson 8

SLOPE FIELDS- introductory lesson

Watch from the 10:10 minute marker to the 17 minute marker
http://www.chaoticgolf.com/vodcasts/calc/lesson6_1/lesson6_1.html
follow along with the example below-

Example 3: On the diagram below, plot the slope field of the differential equation $\frac{dy}{dx} = 2y$.

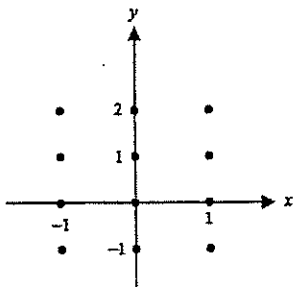


Example 4: Suppose that you know that the point $(0, -1)$ is on a particular solution of the differential equation above. By following slopes, draw on the diagrams above what you think the particular solution look like. (☞: The graph should follow the pattern of the slope field, but may go between the points rather than through them.)

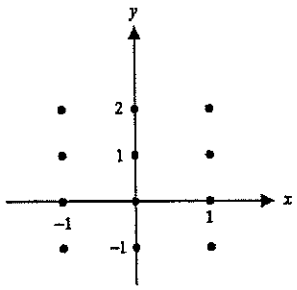
Example 5: Solve the differential equation $\frac{dy}{dx} = 2y$ from the previous example by first **separating the variables.** Find the particular solution that contains the point given in the last example. Does your solution make sense when compared to the graph of the slope field?

Now try some- make a chart

a) $\frac{dy}{dx} = 2x + y$



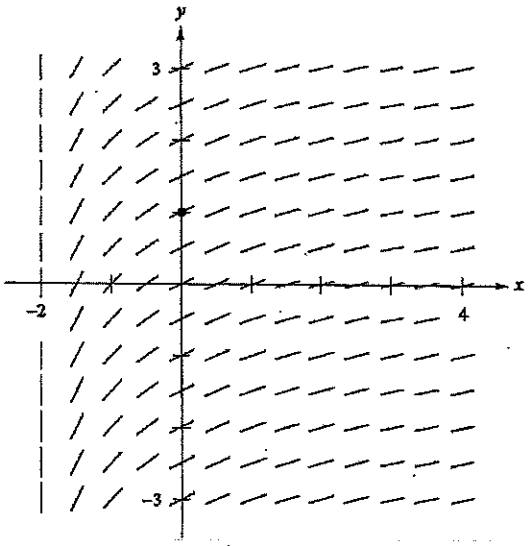
b) $\frac{dy}{dx} = x - 2y$

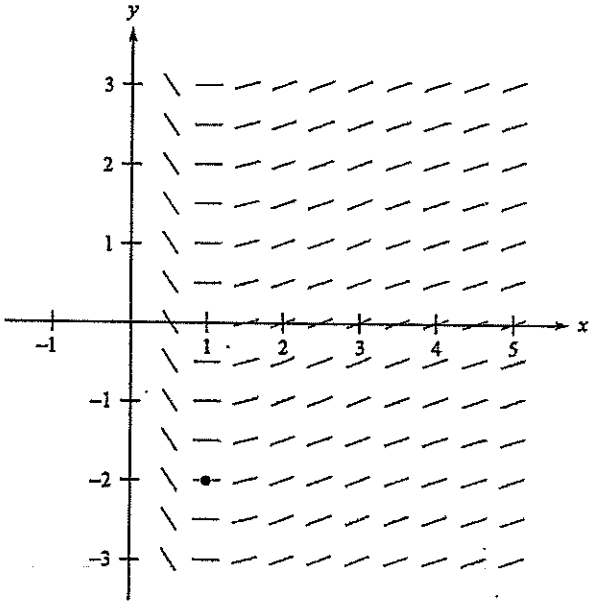


6. For each slope field above, sketch the solution curve that passes through the point (0, 1).

Lesson 9 Slope fields

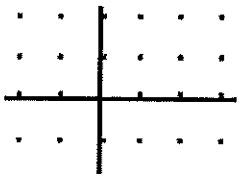
(a) Sketch an approximate solution of the differential equation of the slope field, passing through the given point.





17. Consider the differential equation given by $\frac{dy}{dx} = \frac{xy}{2}$.

(A) On the axes provided, sketch a slope field for the given differential equation.



(B) Let f be the function that satisfies the given differential equation. Write an equation for the tangent line to the curve $y = f(x)$ through the point (1, 1). Then use your tangent line equation to estimate the value of $f(1.2)$.

(C) Find the particular solution $y = f(x)$ to the differential equation with the initial condition $f(1) = 1$. Use your solution to find $f(1.2)$.

(D) Compare your estimate of $f(1.2)$ found in part (b) to the actual value of $f(1.2)$ found in part

(E) Was your estimate from part (b) an underestimate or an overestimate? Use your slope field to explain why.

2005 SCORING GUIDELINES

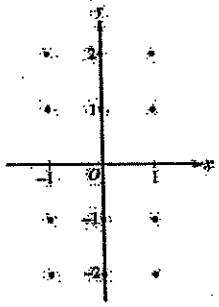
Question 6

Consider the differential equation $\frac{dy}{dx} = -\frac{2x}{y}$.

(a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.
(Note: Use the axes provided in the pink test booklet.)

(b) Let $y = f(x)$ be the particular solution to the differential equation with the initial condition $f(1) = -1$. Write an equation for the line tangent to the graph of f at $(1, -1)$ and use it to approximate $f(1.1)$.

(c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(1) = -1$.



AP CALCULUS AB
2004 SCORING GUIDELINES

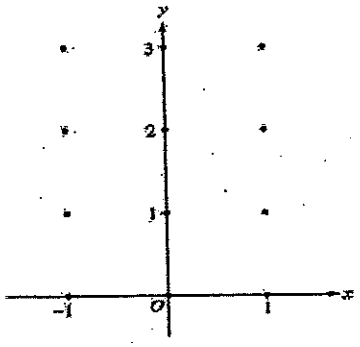
Question 6

Consider the differential equation $\frac{dy}{dx} = x^2(y-1)$.

(a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.
(Note: Use the axes provided in the pink test booklet.)

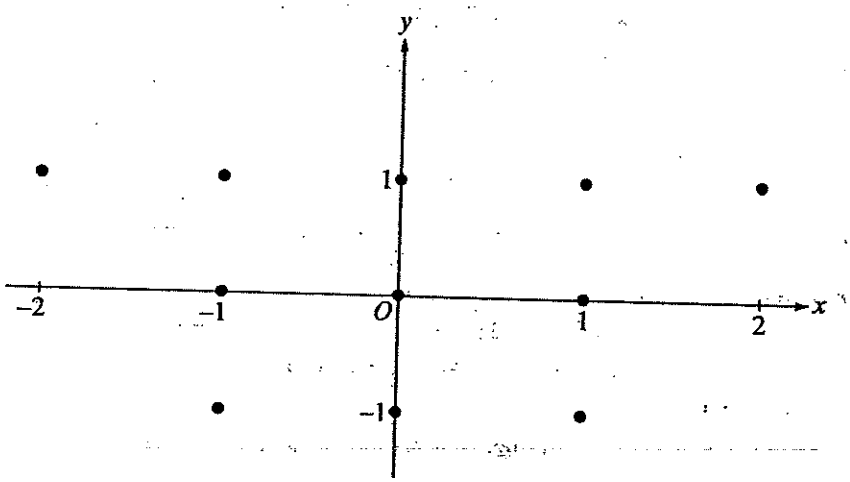
(b) While the slope field in part (a) is drawn at only twelve points, it is defined at every point in the xy-plane. Describe all points in the xy-plane for which the slopes are positive.

(c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$.

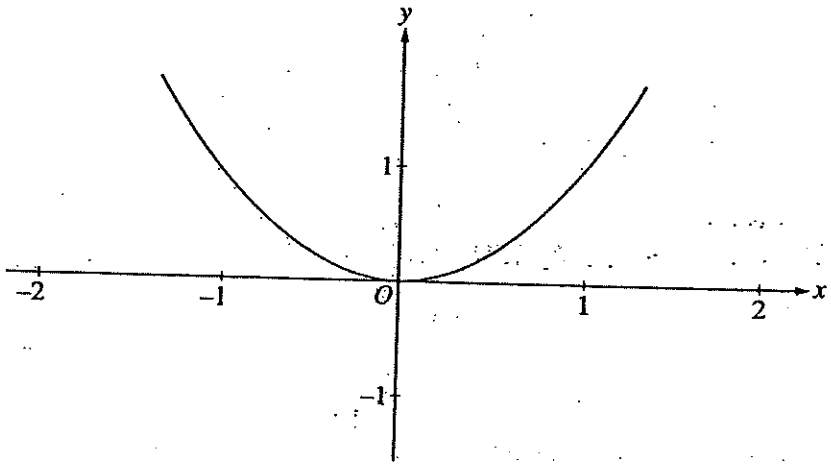


6. Consider the differential equation given by $\frac{dy}{dx} = x(y-1)^2$.

(a) On the axes provided, sketch a slope field for the given differential equation at the eleven points indicated.
(Note: Use the axes provided in the pink test booklet.)



(b) Use the slope field for the given differential equation to explain why a solution could not have the graph shown below.



(c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = -1$.

(d) Find the range of the solution found in part (c).

END OF EXAMINATION