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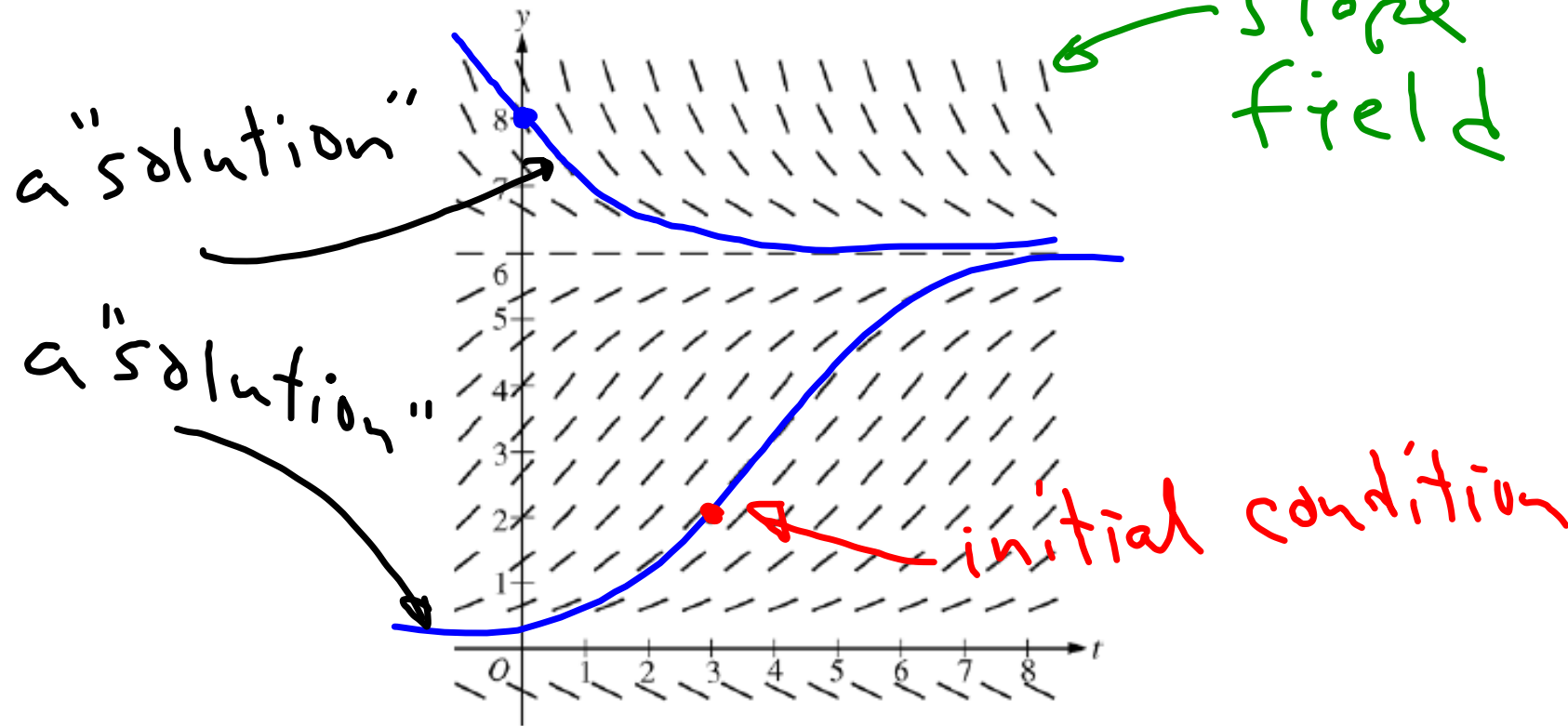
1. What's a slope field and what's it for?
2. What's a diff. equation?
3. What does "solution" mean in terms of diff eqns?

2008 BC

6. Consider the logistic differential equation $\frac{dy}{dt} = \frac{y}{8}(6 - y)$. Let $y = f(t)$ be the particular solution to the differential equation with $f(0) = 8$.

(a) A slope field for this differential equation is given below. Sketch possible solution curves through the points $(3, 2)$ and $(0, 8)$.

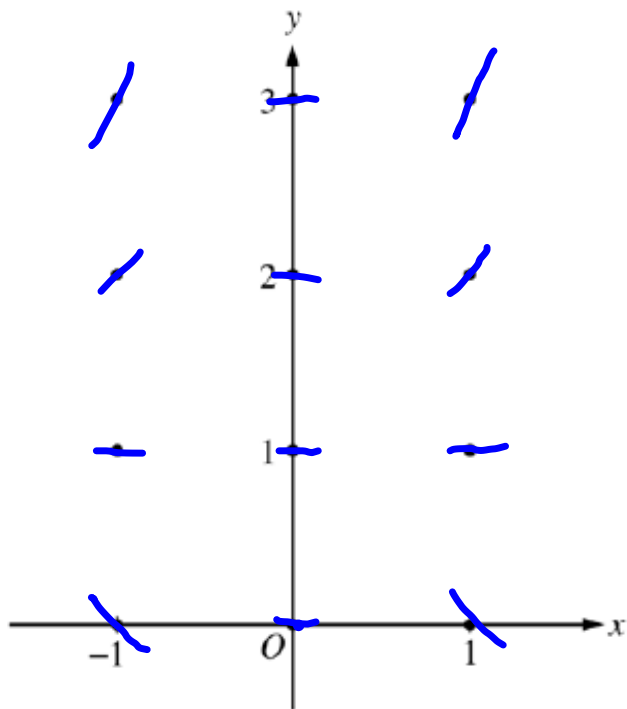
(Note: Use the axes provided in the exam booklet.)



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.)

Point	Slope
(0,0)	0
(1,2)	$1^2(2-1) = 1$
(-1,2)	1
(1,3)	2
(-1,0)	-1



"Preview"

$$\frac{dy}{dx} = x^2(y-1)$$

$$\int \frac{1}{y-1} dy = \int x^2 dx$$

$$\ln|y-1| + C_1 = \frac{1}{3}x^3 + C_2$$

$$\ln|y-1| = \frac{1}{3}x^3 + C_3$$

$$|y-1| = e^{\frac{1}{3}x^3 + C_3}$$

$$|y-1| = e^{\frac{x^3}{3}} \cdot e^{C_3}$$

$$|y-1| = e^{x^3/3} C_4$$

$$y-1 = \pm e^{x^3/3} \cdot C_4$$

$$y-1 = C \cdot e^{x^3/3}$$

$$C = \pm C_4$$

$$y = C \cdot e^{x^3/3} + 1$$

what if $y(0) = 3$?

$$3 = C \cdot e^0 + 1$$

$$3 = C + 1$$

$$C = 2$$

Solution:

$$y = 2 \cdot e^{x^3/3} + 1$$

