

AP Calculus
6.3 – Slope Fields - Part II

1. **TRUE or FALSE?:** Any two solutions to $\frac{dy}{dx} = 5$ are parallel lines. Justify your answer.

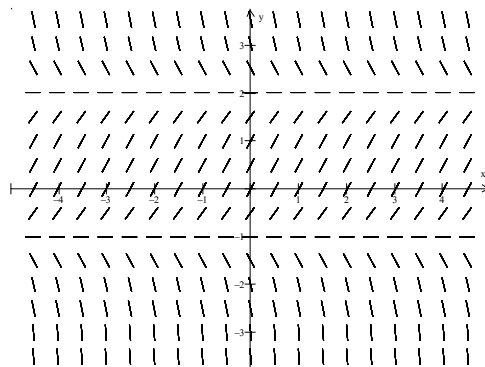
2. A slope field for $\frac{dy}{dx} = 10 - y$ will show: *(select all correct statements)*
 - a. A line with slope -1 and y-intercept 10.
 - b. A horizontal asymptote at $y = 10$.
 - c. A vertical asymptote at $x = 10$.
 - d. A family of parabolas opening down.
 - e. A family of parabolas opening left.
 - f. A graph that is CU for $y < 10$.
 - g. A graph that is decreasing for $y > 10$.
 - h. A maximum at $y = 10$.

3. Consider the following DE:
 - a. $\frac{dy}{dx} = -\frac{x}{y}$
 - b. $\frac{dy}{dx} = xy + 5$
 - c. $\frac{dy}{dx} = xy^2 - 2$
 - d. $\frac{dy}{dx} = \frac{x^3}{y^2}$
 - e. $\frac{dy}{dx} = \frac{y}{x^2} - 3$
 - i. Which will have a slope field with all negative slopes in the 4th quadrant? Justify your answer.
 - ii. Which will have a slope field with all positive slopes in the 2nd quadrant? Justify your answer.

4. If $\frac{dy}{dx} = 2xy$ and $y = 1$ when $x = 0$, then $y =$
 - a. y^{2x}
 - b. e^{x^2}
 - c. x^2y
 - d. $x^2y + 1$
 - e. $\frac{x^2y^2}{2} + 1$

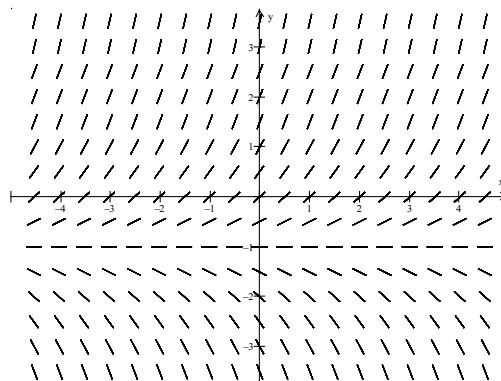
5. The SF for a DE is shown below. Which of the following statements are TRUE for the solutions of the DE?

- a. If $y(0) > 2$ then $\lim_{x \rightarrow -\infty} y(x) = 2$.
- b. If $y(0) > 2$ then $\lim_{x \rightarrow +\infty} y(x) = 2$.
- c. If $-1 < y(0) < 2$ then $\lim_{x \rightarrow -\infty} y(x) = -1$.
- d. If $y(0) < -1$ then $\lim_{x \rightarrow +\infty} y(x) = -1$.
- e. $y(x)$ has horizontal asymptotes at $y = \pm 2$.



6. The SF for a DE is shown below. Which of the following statements are TRUE for the solutions of the DE?

- a. For $x < 0$, all solutions are decreasing.
- b. All solutions have a horizontal asymptote at $x = -1$.
- c. For $y > -1$, all solutions are increasing.
- d. If $y(0) < -1$ then $\lim_{x \rightarrow -\infty} y(x) = -1$.



7. Consider $\frac{dy}{dx} = 1 - y$, defined over \mathbb{R} . The slope field for this DE is given below.

- a. Find the general solution.
- b. Find the particular solution that satisfies the initial condition $y(0) = -2$. Sketch this solution on the SF.
- c. The SF indicates that for some of the solutions, $\lim_{x \rightarrow -\infty} y(x) = \infty$ and for other solutions, $\lim_{x \rightarrow -\infty} y(x) = -\infty$. Determine the values of C for which $\lim_{x \rightarrow -\infty} y(x) = -\infty$.

