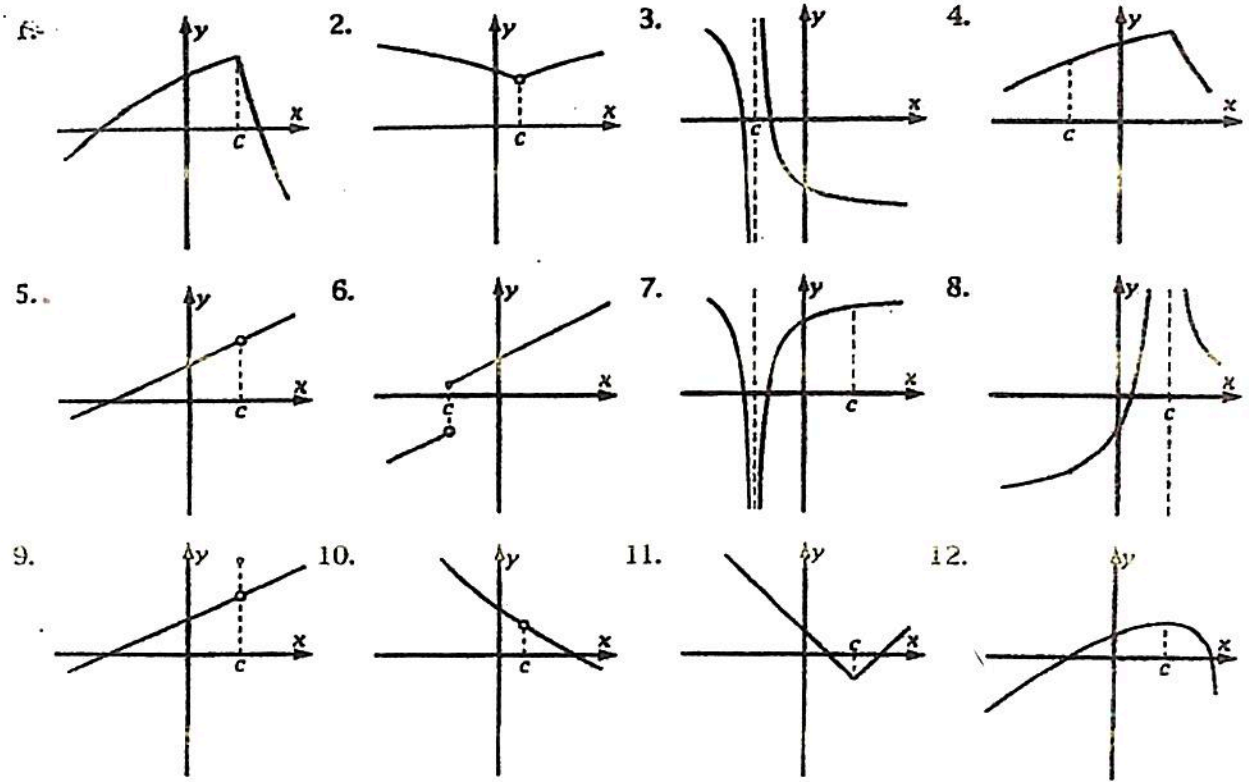


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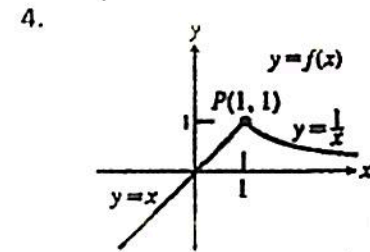
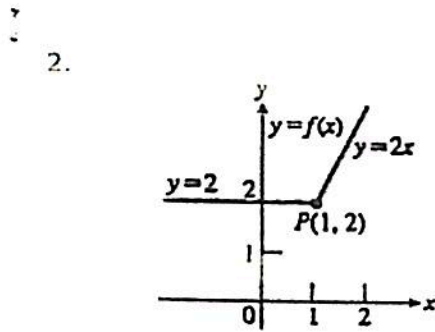
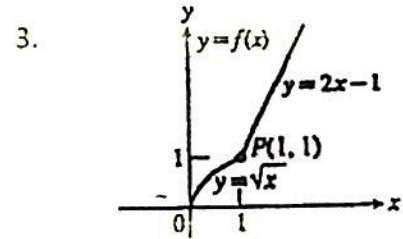
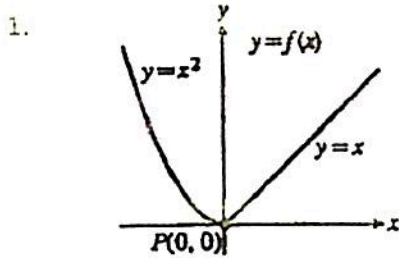
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AP Calculus AB – Differentiability

A. For # 1 – 12, state whether the function is continuous, differentiable, both, or neither at $x = c$.



B. For # 1 – 4, compare the left-hand and right-hand derivatives to show that the function is not differentiable at P.



For # 5 – 8, determine if $f(x)$ is differentiable at the value mentioned.

5. $f(x) = \begin{cases} x^2 - 4x + 8, & x \leq 3 \\ 11 - x, & x > 3 \end{cases}$ Is $f(x)$ differentiable at $x = 3$?

6. $f(x) = \begin{cases} x^2 - 6x + 8, & x \geq 1 \\ 7 - 4x, & x < 1 \end{cases}$ Is $f(x)$ differentiable at $x = 1$?

7. $f(x) = \begin{cases} x^2 - x + 1, & x < 1 \\ x + 1, & x \geq 1 \end{cases}$ Is $f(x)$ differentiable at $x = 1$?

$$8. f(x) = \begin{cases} x^2 - x + 1, & x \leq 1 \\ 2 - x, & x > 1 \end{cases} \quad \text{Is } f(x) \text{ differentiable at } x = 1?$$

For # 9 – 12, find the values of a and b that make $f(x)$ differentiable at the value stated.

$$9. f(x) = \begin{cases} ax^2 + 10, & x < 2 \\ x^2 - 6x + b, & x \geq 2 \end{cases} \quad \text{at } x = 2$$

$$10. f(x) = \begin{cases} x^3, & x < 1 \\ a(x-2)^2 + b, & x \geq 1 \end{cases} \quad \text{at } x = 1$$

$$11. f(x) = \begin{cases} -(x-3)^2 + 7, & x \geq 2 \\ ax^3 + b, & x < 2 \end{cases} \quad \text{at } x = 2$$

$$12. f(x) = \begin{cases} \frac{a}{x}, & x \leq 1 \\ 12 - bx^2, & x > 1 \end{cases} \quad \text{at } x = 1$$