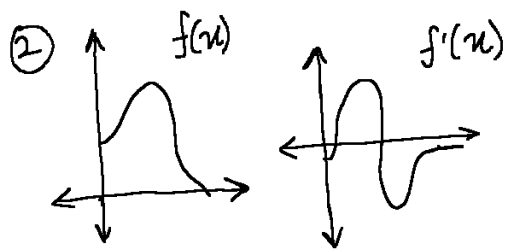① Use the graph to analyze
$$x = -5, -4, -2, 0, 2$$

②



③ $f(x) = 8x^2 - 4x + 2$
$$\frac{dy}{dx} = 16x - 4$$

④ $f(x) = 7x+5 / 2x+5$
$$\frac{dy}{dx} = \frac{7(2x+5) - 2(7x+5)}{(2x+5)^2}$$
$$\frac{dy}{dx} = \frac{25}{(2x+5)^2} \text{ where}$$
$$D + f(x) \text{ \& } f'(x): x \neq \frac{5}{2}$$

⑤ $f(x) = \frac{5}{2x^2}$
$$\frac{dy}{dx} = \frac{5}{2}x^2 = \frac{-5}{x^3} \text{ where}$$
$$D + f'(x) \text{ \& } f(x): x \in \mathbb{R} \mid x \neq 0$$

⑥ $f(x) = 3x + \sqrt{x}$
$$\frac{dy}{dx} = 3 + \frac{1}{2\sqrt{x}} \text{ where}$$
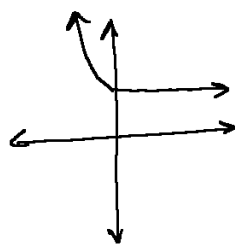$$D + f'(x): x \in [0,\infty) = f(x)$$
$$f'(x) = (0,\infty)$$

⑦ $f(x) = |x-2|;$ where $f(2) = 0$
$$\lim_{x \to 2^-} \frac{|x-2|}{x-2} = \frac{-(x-2)}{x-2} = \boxed{-1}$$
$$\lim_{x \to 2^+} \frac{|x-2|}{x-2} = \frac{x-2}{x-2} = \boxed{1}$$

⑧ $f(x) = \begin{cases} x^2+6 & x<0 \\ 6 & x \geq 0 \end{cases}$



discontinuous
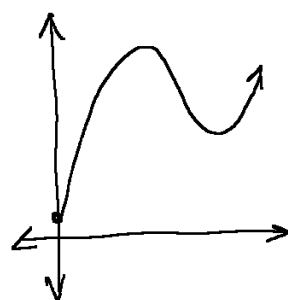$x \in \mathbb{Q}$
differentiable
$x \in \mathbb{R}$

⑨ Use the table + answers
$$f'(2) \approx \frac{14-10}{-4} = \boxed{-1}$$
$f'(x)$ is positive at $x \in (6,12)$
negative at $x \in (0,6)$

⑩ Predict what each graph is
$f B \quad f'A \quad f''C$

⑪



+vel: $(0,3) \cup (7,8)$
-vel: $(3,7)$
+accel: $(5,8)$
-accel: $(0,5)$