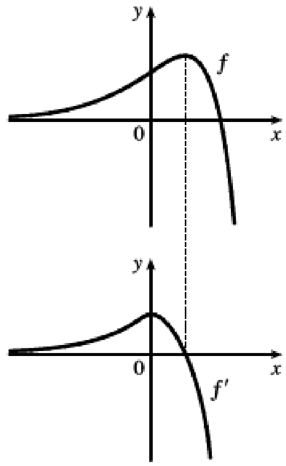
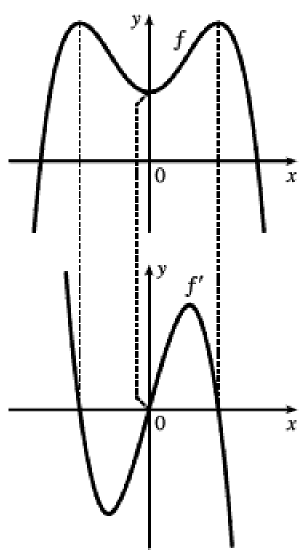
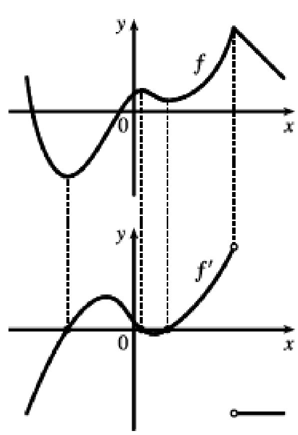
32.



33.



34.



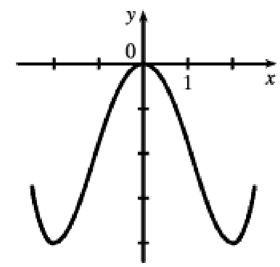
37. f is not differentiable: at $x = -4$ because f is not continuous, at $x = -1$ because f has a corner, at $x = 2$ because f is not continuous, and at $x = 5$ because f has a vertical tangent.

41. (a) $f'(x) > 0$ on $(-2, 0)$ and $(2, \infty)$ $\Rightarrow$ f is increasing on those intervals. $f'(x) < 0$ on $(-\infty, -2)$ and $(0, 2)$ $\Rightarrow$ f is decreasing on those intervals.

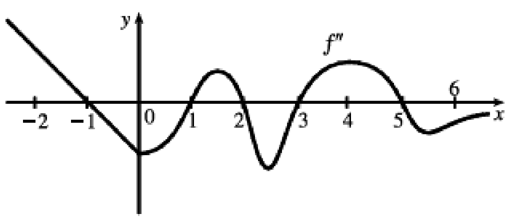
(b) $f'(x) = 0$ at $x = -2$, 0, and 2, so these are where local maxima or minima will occur. At $x = \pm 2$, f' changes from negative to positive, so f has local minima at those values. At $x = 0$, f' changes from positive to negative, so f has a local maximum there.

(c) f' is increasing on $(-\infty, -1)$ and $(1, \infty)$ $\Rightarrow$ $f'' > 0$ and f is concave upward on those intervals. f' is decreasing on $(-1, 1)$ $\Rightarrow$ $f'' < 0$ and f is concave downward on this interval.

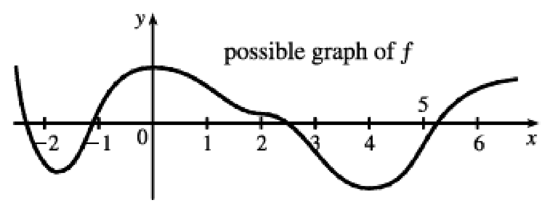
(d)



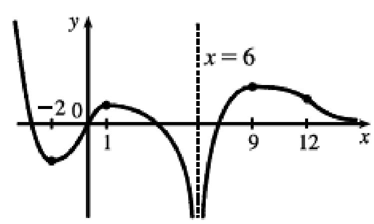
42. (a)



(b)



43. $f(0) = 0$, $f'(-2) = f'(1) = f'(9) = 0$, $\lim_{x\to\infty} f(x) = 0$, $\lim_{x\to 6} f(x) = -\infty$,
$f'(x) < 0$ on $(-\infty, -2)$, $(1, 6)$, and $(9, \infty)$, $f'(x) > 0$ on $(-2, 1)$ and $(6, 9)$,
$f''(x) > 0$ on $(-\infty, 0)$ and $(12, \infty)$, $f''(x) < 0$ on $(0, 6)$ and $(6, 12)$



46. Let f be the function shown. Since f is negative for $x < 0$ and positive for $x > 0$, F is decreasing for $x < 0$ and increasing for $x > 0$. f is increasing on $(-a, a)$ (from the low point to the high point) so its derivative f' (the second derivative of F) is positive, making F concave upward on $(-a, a)$. f is decreasing elsewhere, so its derivative f' is negative and F is concave downward on $(-\infty, -a)$ and (a, ∞).