

Curve Sketching

Sketch the following continuous functions.

$$f(0) = 1; f(2) = 3$$

$$f'(0) = f'(2) = 0$$

1. $f'(x) < 0$ if $x < 0$ or $x > 2$; $f'(x) > 0$ if $0 < x < 2$
 $f''(x) > 0$ if $x < 1$; $f''(x) < 0$ if $x > 1$

$$f(0) = 4; f(2) = 2; f(5) = 6$$

$$f'(0) = f'(2) = 0$$

2. $f'(x) > 0$ if $x < 0$ or $x > 2$; $f'(x) < 0$ if $0 < x < 2$
 $f''(x) < 0$ if $x < 1$ or if $3 < x < 5$
 $f''(x) > 0$ if $1 < x < 3$ or if $x > 5$

$$f(0) = 2; f(2) = f(-2) = 1$$

$$f'(0) = 0$$

3. $f'(x) > 0$ if $x < 0$; $f'(x) < 0$ if $x > 0$
 $f''(x) < 0$ if $-2 < x < 2$; $f''(x) > 0$ if $x < -2$ or $x > 2$

$$f(1) = 4$$

4. $f'(x) > 0$ if $x < 1$; if $x > 1$
 $f''(x) > 0 \forall x \neq 1$

$$f(-2) = f(6) = -2; f(0) = f(4) = 0; f(2) = f(8) = 3$$

$$f'(x) \text{ is undefined at } 2 \text{ and at } 6; f'(0) = 1$$

5. $f'(x) > 0$ on $(-\infty, 2)$ and $(6, \infty)$
 $f'(x) < 0$ on $(2, 6)$
 $f''(x) < 0$ on $(-\infty, 0)$, $(4, 6)$, and $(6, \infty)$
 $f''(x) > 0$ on $(0, 2)$ and $(2, 4)$

$$f(0) = 2; f(2) = 1; f(4) = f(10) = 0; f(6) = -4$$

$$f'(2) = f'(6) = 0$$

$$f'(x) < 0 \text{ on } (-\infty, 2), (2, 4), (4, 6), \text{ and } (10, \infty)$$

$$6. \quad f'(x) > 0 \text{ on } (6, 10)$$

$$f'(4) \text{ and } f'(10) \text{ do not exist}$$

$$f''(x) > 0 \text{ on } (-\infty, 2), (4, 10), \text{ and } (10, \infty)$$

$$f''(x) < 0 \text{ on } (2, 4)$$

$$f(x) = x \text{ if } x = -1, 2, 4, \text{ or } 8$$

$$f'(x) = 0 \text{ if } x = -1, 4, 6, \text{ or } 8$$

$$7. \quad f'(x) < 0 \text{ on } (-\infty, -1), (4, 6), \text{ and } (8, \infty)$$

$$f'(x) > 0 \text{ on } (-1, 4), \text{ and } (6, 8)$$

$$f''(x) > 0 \text{ on } (-\infty, 0), (2, 3), \text{ and } (5, 7)$$

$$f''(x) < 0 \text{ on } (0, 2), (3, 5), \text{ and } (7, \infty)$$