

pgs 215 # 1, 2, 6-10, 21-24, 26, 30, 49, 50

① $y = x^2 - x - 1$

$y' = 2x - 1$

$$2x - 1 \quad \begin{array}{c} - \quad | \quad + \\ \hline \rightarrow \quad \frac{1}{2} \quad \uparrow \end{array}$$

min at $(\frac{1}{2}, y(\frac{1}{2}))$

$= (\frac{1}{2}, -\frac{5}{4})$

$-\frac{5}{4}$ is absolute min

② $y = -2x^3 + 6x^2 - 3$

$y' = -6x^2 + 12x$

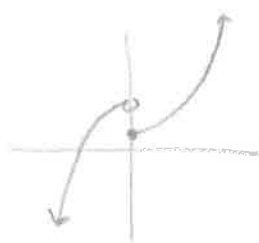
$= -6x(x - 2)$

$$\begin{array}{c} -6x \quad - \quad | \quad + \quad | \quad + \\ x-2 \quad - \quad | \quad - \quad | \quad + \\ \hline \textcircled{+} \quad 0 \quad \textcircled{-} \quad 2 \quad \textcircled{+} \\ \uparrow \quad \quad \downarrow \quad \quad \uparrow \end{array}$$

local max $(2, y(2)) = (2, 5)$

local min $(0, -3)$

⑥ $y = \begin{cases} 3 - x^2, & x < 0 \\ x^2 + 1, & x \geq 0 \end{cases}$



local min
at $(0, 1)$

⑦ $y = 4x^3 + 21x^2 + 36x - 20$

$y' = 12x^2 + 42x + 36$

$y'' = 24x + 42 = 2(12x + 21)$

$$y'' \quad \begin{array}{c} + \quad | \quad - \\ \hline \textcircled{+} \quad -\frac{7}{4} \quad \textcircled{-} \end{array}$$

concave up $x < -\frac{7}{4}$

concave down $x > -\frac{7}{4}$

⑧ $y = -x^4 + 4x^3 - 4x + 1$

$y' = -4x^3 + 12x^2 - 4$

$y'' = -12x^2 + 24x = -12x(x - 2)$

$$\begin{array}{c} -12x \quad + \quad | \quad - \quad | \quad - \\ x-2 \quad - \quad | \quad - \quad | \quad + \\ \hline \textcircled{-} \quad 0 \quad \textcircled{+} \quad 2 \quad \textcircled{-} \end{array}$$

concave up
on $(0, 2)$

concave down
 $(-\infty, 0)$ and $(2, \infty)$

⑨ $y = 2x^{1/5} + 3$

$y' = \frac{2}{5}x^{-4/5}$

$y'' = -\frac{8}{25}x^{-9/5}$

$$y'' \quad \begin{array}{c} + \quad | \quad - \\ \hline \textcircled{+} \quad 0 \quad \textcircled{-} \end{array}$$

concave up $x < 0$

concave down $x > 0$

$$(10) \quad y = 5 - x^{2/3}$$

$$y' = -\frac{2}{3}x^{-1/3}$$

$$y'' = \frac{2}{9}x^{-4/3}$$

concave up $(0, \infty)$

concave down $(-\infty, 0)$

$$(21) \quad a) f'(x) = 0, x = \pm 1$$

$$f'(x) > 0 \quad (-\infty, -1) \text{ and } (1, \infty)$$

$$f'(x) < 0 \quad (-1, 1)$$

$$b) f''(x) = 0, x = 0$$

$$f''(x) > 0, (0, \infty)$$

$$f''(x) < 0, (-\infty, 0)$$

$$(22) \quad a) f'(x) = 0, x = \pm 1.25, 0$$

$$f'(x) > 0 \quad (-1.25, 0) \text{ and } (1.25, \infty)$$

$$f'(x) < 0 \quad (-\infty, -1.25) \text{ and } (0, 1.25)$$

$$b) f''(x) = 0, x \approx \pm 0.75$$

$$f''(x) > 0 \quad (-\infty, -0.75) \text{ and } (0.75, \infty)$$

$$f''(x) < 0 \quad (-0.75, 0.75)$$

$$(23) \quad a) (-\infty, -2) \text{ and } (0, 2)$$

$$b) (-2, 0) \text{ and } (2, \infty)$$

$$c) \text{max at } x = -2, x = 2$$

$$\text{min at } x = 0$$

$$(24) \quad a) (-2, 2) \quad x \neq 0$$

$$b) (-\infty, -2) \text{ and } (2, \infty)$$

$$c) \text{max at } x = 2$$

$$\text{min at } x = -2$$

$$(25) \quad a) \text{max/mins on } S(t).$$

$$t \approx 2.2, 6, 9.9$$

$$b) \text{Points of inflection on } S(t)$$

$$t \approx 4, 8, 11$$

$$(30) \quad a) \text{Max/mins on } S(t)$$

$$t = -0.2, 4, 12$$

$$b) \text{PoI on } S(t)$$

$$t \approx 1.5, 5.2, 8, 11, 13$$