

$$4i) f(x) = \frac{4}{3}x^3 - 6x^{2/3}$$

$$f' = 4x^2 - 4x^{-1/3}$$

$$= 4x^2 - \frac{4}{x^{1/3}}$$

$$f' = \frac{4x^{7/3} - 4}{x^{1/3}}$$

$$f'(x) = 0$$

$$4x^{7/3} - 4 = 0$$

$$4x^{7/3} = 4$$

$$x^{7/3} = 1$$

$$x^7 = 1$$

$$\boxed{x=1}$$

$$f''(x) \neq 0$$

$$x^{1/3} = 0$$

$$\boxed{x=0}$$

$$2) y = \sqrt{x}(5-x)^2 \quad x \geq 0$$

$$y' = x^{1/2} \cdot 2(5-x)(-1) + (5-x)^2 \cdot \frac{1}{2}x^{-1/2}$$

$$= -2x^{1/2}(5-x) + \frac{(5-x)^2}{2x^{1/2}}$$

$$= \frac{-4x(5-x) + (5-x)^2}{2x^{1/2}}$$

$$= \frac{(5-x)[-4x + 5-x]}{2x^{1/2}}$$

$$f'(x) = 0$$

$$(5-x)(5-5x) = 0$$

$$\boxed{x=5} \text{ or } \boxed{x=1}$$

$$f'(x) \neq 0$$

$$2x^{1/2} = 0$$

$$\boxed{x=0}$$

$$f' = \frac{(5-x)(5-5x)}{2x^{1/2}}$$

$$5c) y = 4x^3 - 12x - 5$$

$$[-3, 2]$$

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

$$\underline{y' = 0}$$

$$12x^2 - 12 = 0$$

$$12(x^2 - 1) = 0$$

$$12(x-1)(x+1) = 0$$

$$\boxed{x=1} \text{ or } \boxed{x=-1}$$

$$y(1) = -13$$

$$y(-1) = 3$$

$$y(-3) = -77$$

$$y(2) = 3$$

Abs max

$$y(-1) = y(2) = 3$$

Abs min

$$y(-3) = -77$$

$$5e) f(x) = \frac{3}{4}x^{\frac{4}{3}} - 2x$$

$$[1, 27]$$

$$f'(x) = x^{\frac{1}{3}} - 2$$

$$\underline{f'(x) = 0}$$

$$x^{\frac{1}{3}} - 2 = 0$$

$$x^{\frac{1}{3}} = 2$$

$$x = 8$$

$$f(1) = -5/4$$

$$f(8) = -4$$

Abs min

$$f(27) = \frac{27}{4}$$

Abs max

$$5f) f(x) = \frac{x^2}{x^2-9} \quad [-1, 2]$$

$$f'(x) = \frac{(x^2-9)(2x) - x^2(2x)}{(x^2-9)^2}$$

$$f'(x) = \frac{-18x}{(x^2-9)^2}$$

$$\underline{f'(x) = 0}$$

$$-18x = 0$$

$$\boxed{x=0}$$

$$f(-1) = -\frac{1}{8}$$

$$f(0) = 0 \quad \text{Abs Max}$$

$$f(2) = -\frac{4}{5} \quad \text{Abs Min}$$

$$\underline{f'(x) \neq 0}$$

$$(x^2-9)^2 = 0$$

$$x^2-9 = 0$$

$$(x-3)(x+3) = 0$$

$$\boxed{x=3} \text{ or } \boxed{x=-3}$$

↑  
not in interval  
[-1, 2]

$$5 \text{ g) } y = 3x^{\frac{4}{3}} - 12x^{\frac{1}{3}} \quad [-1, 8]$$

$$y' = 4x^{\frac{1}{3}} - 4x^{-\frac{2}{3}}$$

$$y' = 4x^{\frac{1}{3}} - \frac{4}{x^{\frac{2}{3}}}$$

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

$$y' = 0$$

$$4x - 4 = 0$$

$$4x = 4$$

$$\boxed{x = 1}$$

$$y' \neq 0$$

$$x^{\frac{2}{3}} = 0$$

$$\boxed{x = 0}$$

$$y(-1) = 15$$

$$y(1) = -9 \quad \text{Abs Min}$$

$$y(0) = 0$$

$$y(8) = 24 \quad \text{Abs Max}$$

$$i) f(x) = x\sqrt{50-x^2} \quad [0, 7]$$

$$f' = x \cdot \frac{1}{2}(50-x^2)^{-1/2} (-2x) + (50-x^2)^{1/2} (1)$$

$$f' = \frac{-x^2}{(50-x^2)^{1/2}} + (50-x^2)^{1/2}$$

$$f' = \frac{-x^2 + 50 - x^2}{(50-x^2)^{1/2}}$$

$$f' = \frac{50 - 2x^2}{(50-x^2)^{1/2}}$$

$$\frac{f'(x) = 0}{}$$

$$50 - 2x^2 = 0$$

$$50 = 2x^2$$

$$25 = x^2$$

$$\pm 5 = x$$

only

$$\boxed{x=5}$$

fits  
in interval

$$\frac{f'(x) \neq 0}{}$$

$$(50-x^2)^{1/2} = 0$$

$$50 - x^2 = 0$$

$$\boxed{\pm\sqrt{50} = x}$$

Don't fit in  
interval

$$f(0) = 0 \quad \text{Abs min}$$

$$f(5) = 25 \quad \text{Abs max.}$$

$$f(7) = 7$$