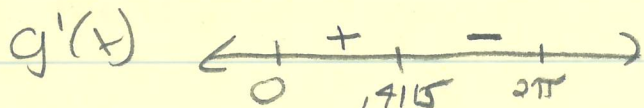


22)  $g(x) = 2x + 5\cos x \quad [0, 2\pi]$

$g'(x) = 2 - 5\sin x = 0$

$-5\sin x = -2$   
 $\sin x = 2/5$   
 $x = .4115$



$g(0) = 5$        $g(.4115) = 5.406$        $g(2\pi) = 17.566$

abs. max  $(2\pi, 17.566)$

23)  $f(x) = \frac{x}{\sqrt{x^2+1}} \quad [0, 2]$

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

$= \frac{x^2+1-x^2}{\sqrt{x^2+1}} \cdot \frac{1}{x^2+1} = \frac{1}{(x^2+1)^{3/2}} = 0$       no crit #

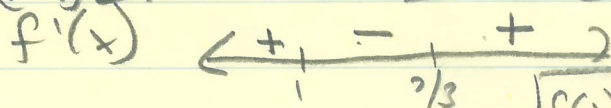
$f(0) = 0$        $f(2) = 2/\sqrt{5}$

max  $(2/\sqrt{5}, 2/3)$   
min  $(0, 0)$

24)  $f(x) = (x-1)^2(x-3)$

$f'(x) = (x-1)^2 + (x-3)(2)(x-1)$

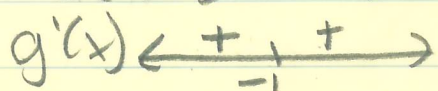
$(x-1)[x-1+2x-6] = (x-1)(3x-7)$        $x = 1, 7/3$



$f(x)$  inc  $(-\infty, 1)$   $(7/3, \infty)$   
dec  $(1, 7/3)$

25)  $g(x) = (x+1)^3$

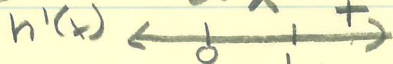
$g'(x) = 3(x+1)^2$        $x = -1$



$g(x)$  inc  $(-\infty, -1)$   $(-1, \infty)$

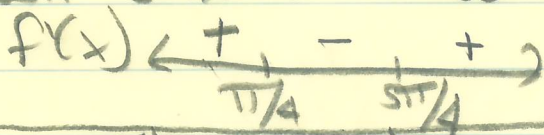
26)  $h(x) = \sqrt{x}(x-3) = x^{3/2} - 3x^{1/2}$

$h'(x) = \frac{3}{2}x^{1/2} - \frac{3}{2}x^{-1/2} = \left[ \frac{3}{2}\sqrt{x} - \frac{3}{2\sqrt{x}} \right]$        $\frac{3x-3}{2\sqrt{x}}$   
 $x = 0, 1$



27)  $f(x) = \sin x + \cos x \quad 0 \leq x \leq 2\pi$

$f'(x) = \cos x - \sin x = 0$        $\cos x = \sin x$        $x = \pi/4, 5\pi/4$



inc  $(-\infty, \pi/4)$   $(5\pi/4, \infty)$   
dec  $(\pi/4, 5\pi/4)$

$$(28) f(x) = x^{2/3} \quad [1, 8]$$

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

$$\frac{f(b) - f(a)}{b - a} = \frac{4 - 1}{8 - 1} = \frac{3}{7}$$

$$\frac{2}{3} x^{1/3} = \frac{3}{7}$$

$$14 = 9x^{1/3}$$

$$\frac{14}{9} = x^{1/3}$$

$$x = \left(\frac{14}{9}\right)^3 = \frac{2744}{729} \approx 3.764$$

$$(29) f(x) = \frac{1}{x} \quad [1, 4]$$

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

$$\frac{f(b) - f(a)}{b - a} = \frac{\frac{1}{4} - 1}{4 - 1} = \frac{-3/4}{3} = -\frac{1}{4}$$

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

$$\boxed{x^2 = 4}$$
$$\boxed{x = 2}$$

$$(30) h(x) = \frac{2x+3}{x-4}$$

Vertical asymptote at  $x=4$  horizontal asymptote at  $y=2$

$$(31) f(x) = \frac{3}{x} - 2$$
$$= \frac{3 - 2x}{x}$$

Vertical asymptote at  $x=0$  horizontal asymptote at  $y=-2$

$$(32) g(x) = \frac{5x^2}{x^2+2}$$

no vertical asymptote horizontal asymptote at  $y=5$

$$(33) f(x) = \frac{3x}{\sqrt{x^2+2}}$$

no vertical asymptote horizontal asymptote at  $y=3, -3$