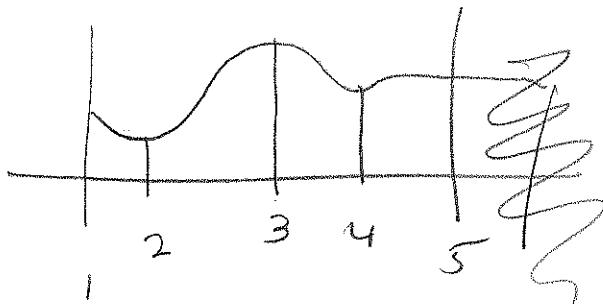


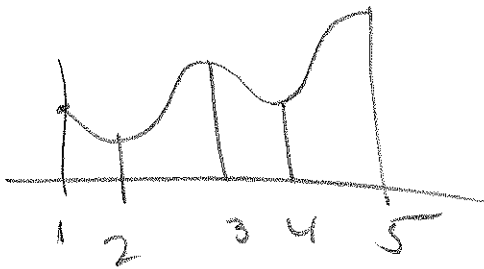
201 §3.1 #5 5, 6, 7, 9, 15 - 31, 35, 41, 47, 53

(5) No abs. min      Local min: (1, 3)  
 Abs max: (4, 5)      (2, 2), (5, 3)  
 Local max: (4, 5), (6, 4)

(7) cont'd on [1, 5],  
 Abs min @ 2, Abs max @ 3, Local min  
 at 4



(9) Abs max @ 5, abs min @ 2  
 loc max @ 3, local min @ 2, 4



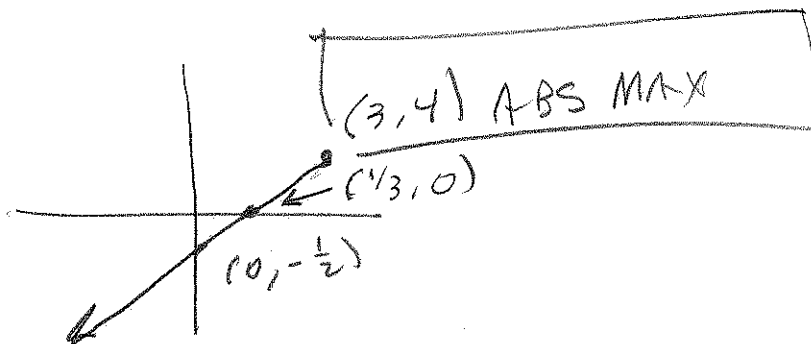
201 S 21 #5 15-31, 35, 41, 47, 53

#5 15-28 sketch & use it to find  
Abs & local extremes

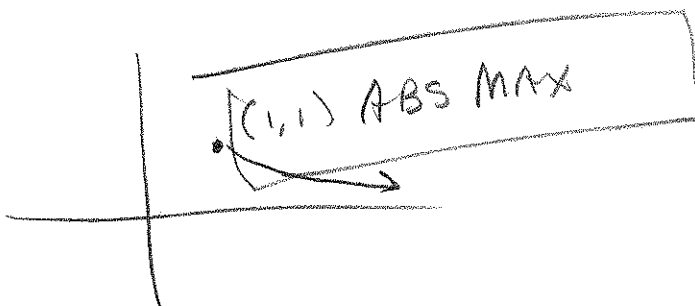
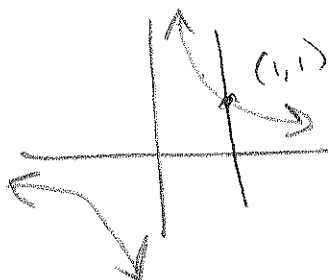
(15)  $f(x) = \frac{1}{2}(3x - 1)$   $x \leq 3$

$$f(3) = \frac{1}{2}(9 - 1) = \frac{1}{2}(8) = 4$$

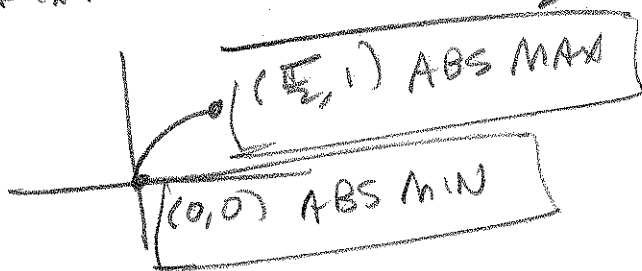
$$f(0) = -\frac{1}{2}$$



(17)  $f(x) = \frac{1}{x}$ ,  $x \geq 1$

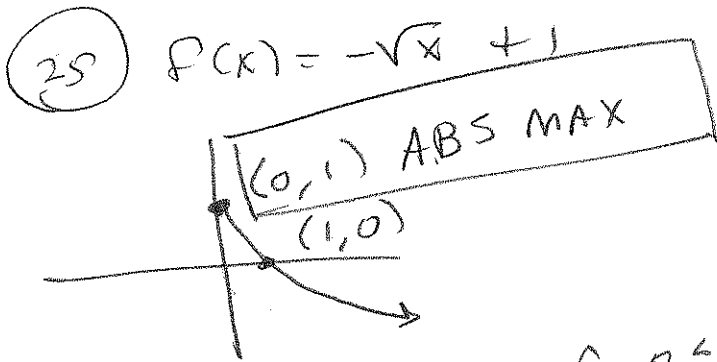
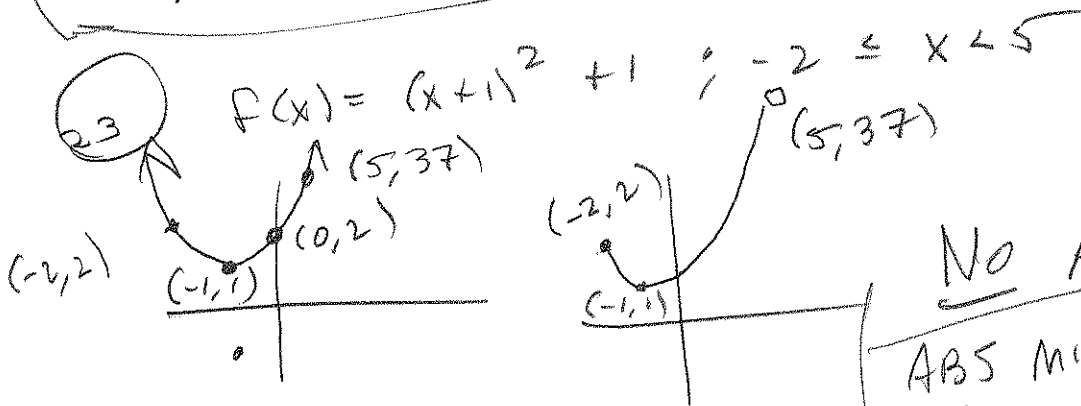
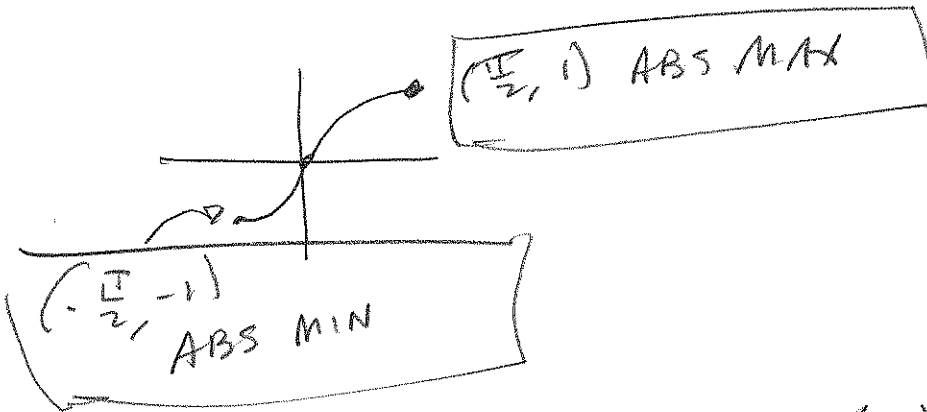


(19)  $f(x) = \sin x$   $0 \leq x \leq \frac{\pi}{2}$



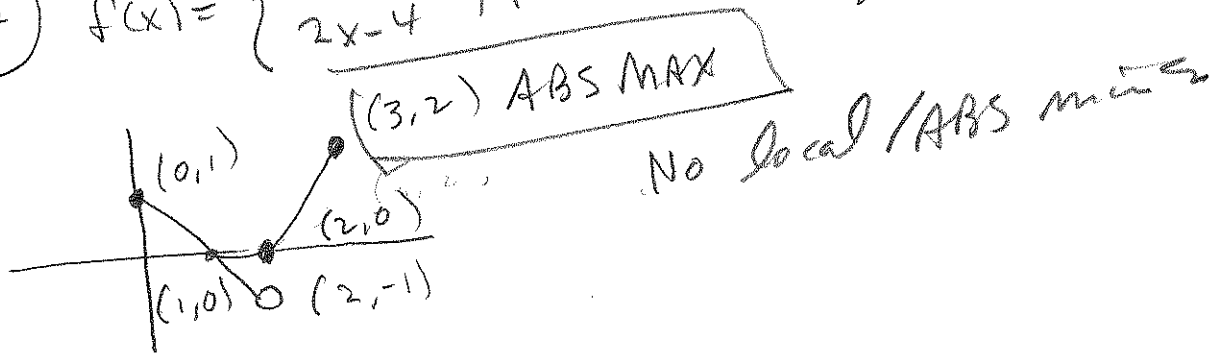
201 §3.1 #5 21-31, 35, 41, 47, 53

(21)  $f(x) = \sin x$ ,  $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$



(27)  $f(x) = \begin{cases} 1-x & \text{if } 0 \leq x < 2 \\ 2x-4 & \text{if } 2 \leq x \leq 3 \end{cases}$

$1-2 = -1$   
 $2(2)-4 = 0$   
 $2(3)-4 = 2$



201 § 3.1 #s 29, 31, 35, 41, 47, 43

(#s 29-42 Find critical #s

(29)  $f(x) = -\frac{1}{2}x^2 + \frac{1}{3}x + 4$

$$f'(x) = -x + \frac{1}{3} \stackrel{\text{SET}}{=} 0 \rightarrow \boxed{x = \frac{1}{3}}$$

(31)  $f(x) = 2x^3 - 3x^2 - 36x$

$$f'(x) = 6x^2 - 6x - 36 \stackrel{\text{SET}}{=} 0$$

$$\Rightarrow x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$\Rightarrow \boxed{x = -2, 3}$$

(35)  $g(y) = \frac{y-1}{y^2y+1}$

$$\begin{array}{l} y-1=0 \\ \boxed{y=1} \\ \text{x-axis} \end{array}$$

$$y^2y+1=0$$

$$y^2y + \left(\frac{1}{2}\right)^2 = \frac{1}{4} + 1$$

$$= \left(y - \frac{1}{2}\right)^2 + \frac{3}{4} \stackrel{\text{SET}}{=} 0$$

~~\*~~ Never, for  $y \in \mathbb{R}$

$$g'(y) = \frac{1(y^2y+1) - (y-1)(2y-1)}{(y^2y+1)^2} = \frac{y^2y+1 - (2y^2-3y+1)}{c^2}$$

$$= \frac{y^2y+1 - 2y^2+3y-1}{c^2} = \frac{-y^2+2y}{c^2} \stackrel{\text{SET}}{=} 0$$

$$\Rightarrow y^2-2y = y(y-2) = 0 \Rightarrow \boxed{y = 0, 2} \\ \text{critical} \\ \#s.$$

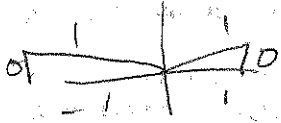
201 5.3.1 #5 41, 47, 53

(41)  $f(\theta) = 2 \cos \theta + \sin^2 \theta$

$\Rightarrow f'(\theta) = -2 \sin \theta - 2 \sin \theta \cos \theta$   
 $= -2 \sin \theta (1 + \cos \theta)$

$\sin \theta = 0$

$\theta = \pm \pi, \pm 2\pi, \dots$   
 $\{n\pi, n \in \mathbb{Z}\}$

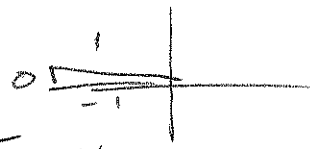


$\cos \theta = -1$

$\theta = \pm \pi, \pm 3\pi, \dots$

$\theta = (2n+1)\pi, n \in \mathbb{Z}$

C.V.s:  $\{n\pi, n \in \mathbb{Z}\}$



#5. 45-56 Find abs max, min on  $[a, b]$

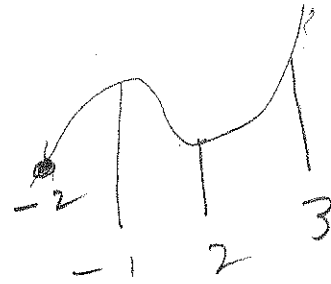
(47)  $f(x) = 2x^3 - 3x^2 - 12x + 1$  on  $[2, 3]$

$f'(x) = 6x^2 - 6x - 12 \stackrel{\text{SET}}{=} 0$

$\Rightarrow x^2 - x - 2 = 0$

$\Rightarrow (x-2)(x+1) = 0$

$x = -1, 2$



$$\begin{array}{r|rrrrr} -1 & 2 & -3 & -12 & 1 \\ & -2 & 5 & 7 & \\ \hline & 2 & -5 & -7 & 8 = f(-1) \end{array}$$
} ABS MAX

$$\begin{array}{r|rrrrr} 2 & 2 & -3 & -12 & 1 \\ & & 4 & 2 & -20 \\ \hline & 2 & 1 & -10 & -19 = f(2) \end{array}$$
} ABS MIN

$$\begin{array}{r|rrrrr} -2 & 2 & -3 & -12 & 1 \\ & & -4 & 14 & -4 \\ \hline & 2 & -7 & 2 & -3 = f(2) \end{array}$$

$$\begin{array}{r|rrrrr} 3 & 2 & -3 & -12 & 1 \\ & & 6 & 9 & -9 \\ \hline & 2 & 3 & -3 & -8 = f(3) \end{array}$$

201 S 3.1 #53

$$\textcircled{53} f(t) = t\sqrt{4-t^2} \quad [-1, 2]$$

$$= t(4-t^2)^{\frac{1}{2}}$$

$$\Rightarrow f'(t) = \sqrt{4-t^2} + t \left( \frac{1}{2}(4-t^2)^{-\frac{1}{2}} \right) (-2t)$$

$$= \sqrt{4-t^2} - \frac{t^2}{\sqrt{4-t^2}} = \frac{4-t^2-t^2}{\sqrt{4-t^2}} = \frac{4-2t^2}{\sqrt{4-t^2}}$$

$$4-2t^2=0$$

$$2t^2=4$$

$$t^2=2$$

$$t = \pm\sqrt{2} \quad \checkmark$$

$$t = +\sqrt{2} \in [-1, 2]$$

$$\sqrt{4-t^2}=0$$

$$4-t^2=0$$

$$t = \pm 2$$

$$t = +2 \in [-1, 2]$$

$$f(-1) = -1\sqrt{4-(-1)^2} = -1\sqrt{3} = -\sqrt{3}$$

$$\boxed{\begin{matrix} \text{MIN} \\ (-1, -\sqrt{3}) \end{matrix}}$$

$$f(\sqrt{2}) = \sqrt{2}\sqrt{4-\sqrt{2}^2} = \sqrt{2}\sqrt{4-2} = \sqrt{2}\sqrt{2} = 2$$

$$\boxed{\begin{matrix} (\sqrt{2}, 2) \\ \text{MAX} \end{matrix}}$$

$$f(2) = 2\sqrt{4-2^2} = 2\sqrt{0} = 0 \quad (2, 0)$$