$f(x) = \frac{2}{3}x^3 + \frac{1}{2}x^2 - 6x + 1 \quad ; [-3, 2]$

$f'(x) = 2x^2 + x - 6$

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

critical #'s: $-2, 3/2$

$f(-3) = 11/2 \approx 5.5$

$f(-2) = 29/3 \approx 9.7$

$f(3/2) = -37/8 \approx -4.$

$f(2) = -11/3 \approx -3.$

abs. max $(-2, 29/3)$

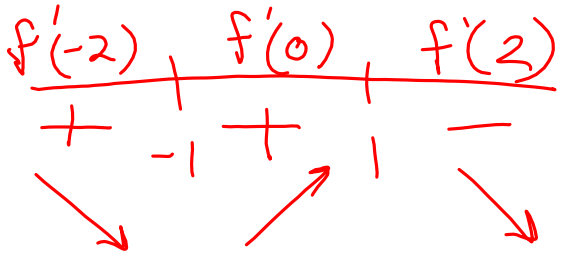
abs. min $(3/2, -37/8)$

3. $f(x) = \frac{x}{(1+x)^2}$

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

critical #'s:

$1, -1$



f is increasing on $(-1, 1)$

f is decreasing on $(-\infty, -1) \cup (1, \infty)$

no relative minima

relative maximum @ $(1, \frac{1}{4})$

6. $f(x)=\sqrt{x-1}$, $[1,5]$

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

$$\frac{f(5)-f(1)}{5-1}=\frac{\sqrt{5-1}-\sqrt{1-1}}{5-1}=\frac{\sqrt{4}-\sqrt{0}}{4}=\frac{2}{4}=\frac{1}{2}$$

$$\frac{1}{2\sqrt{x-1}}=\frac{1}{2}$$

$$2\sqrt{x-1}=2$$

$$\sqrt{x-1}=1$$

$$x-1=1$$

$$\boxed{x=2}$$

1. $xy=256 \Rightarrow y=\frac{256}{x}$

$$S=x+4y$$

$$S(x)=x+4\left(\frac{256}{x}\right)=x+1024x^{-1}$$

$$S'(x)=1-1024x^{-2}$$

$$1-\frac{1024}{x^2}=0$$

$$1=\frac{1024}{x^2}$$

$$x^2=1024$$

$$\boxed{x=32}$$

$$y=\frac{256}{32}=\boxed{8}$$

$$\lim_{x\to 0}(e^x-2x)^{3/x} \quad (=1^\infty)$$

$$y=\lim_{x\to 0}(e^x-2x)^{3/x}$$

$$\ln y=\ln\lim_{x\to 0}(e^x-2x)^{3/x}$$

$$\ln y=\lim_{x\to 0}\ln(e^x-2x)^{3/x}$$

$$\ln y=\lim_{x\to 0}\frac{3}{x}\ln(e^x-2x)$$

$$\ln y=\lim_{x\to 0}\frac{3\ln(e^x-2x)}{x}$$

$$\ln y=\lim_{x\to 0}\frac{3\cdot\frac{1}{e^x-2x}\cdot(e^x-2)}{1}$$

$$\ln y=3\frac{1}{e^0-2(0)}(e^0-2)$$

$$\ln y=\frac{3}{1-0}(1-2)$$

$$\ln y=-3$$

$$e^{\ln y}=e^{-3}$$

$$\boxed{y=\frac{1}{e^3}}$$

$$V=\pi r^2h \qquad V=355\ cm^3$$

$$A=2\pi r^2+2\pi rh \qquad 355=\pi r^2h$$

$$A(r)=2\pi r^2+2\pi r\left(\frac{355}{\pi r^2}\right) \qquad h=\frac{355}{\pi r^2}$$

$$A(r)=2\pi r^2+710r^{-1}$$

$$A'(r)=4\pi r-710r^{-2}$$

$$4\pi r-\frac{710}{r^2}=0$$

$$\frac{4\pi r}{1}=\frac{710}{r^2} \qquad r^3=\frac{710}{4\pi}$$

$$4\pi r^3=710 \qquad r=\sqrt[3]{\frac{710}{4\pi}}$$

$$r\approx 3.837$$

$$\boxed{\text{diameter}=7.67\text{ cm}, \quad \text{height}=7.68\text{cm}}$$

4. $(-1, -21)$ & $(1, -13)$

∪ up on $(-\infty, -1) \cup (1, \infty)$

∩ down on $(-1, 1)$

$f''(-2)$	$f''(0)$	$f''(2)$
+	−	+
∪	∩	∪
	-1	1