$f(x) =$ ~~~~ $[c, d]$

$f'(x) =$ ~~~~

critical #'s: a, b

$f(a) = A$

$f(b) = B$

$f(c) = C$

$f(d) = D$

$$\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$$

$$\frac{f(a)}{g(a)} = \frac{0}{0} \text{ or } \frac{\infty}{\infty}$$

$$\lim_{x\to a}\left[f(x)\right]^{g(x)} \qquad \lim_{x\to 0}(1+x)^{1/x}$$

$f(a)^{g(a)} = 0^0$ or 1^∞

$y = \lim_{x\to a}\left[f(x)\right]^{g(x)}$

$\ln y = \ln \lim_{x\to a}\left[f(x)\right]^{g(x)}$

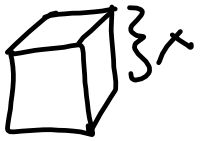
$\ln y = \lim_{x\to a} \ln\left[f(x)\right]^{g(x)}$

$\ln y = \lim_{x\to a} g(x)\ln\left[f(x)\right]$ (rewrite $\frac{0}{0}$ or $\frac{\infty}{\infty}$)

$\ln y = L$

$y = e^L$

10.



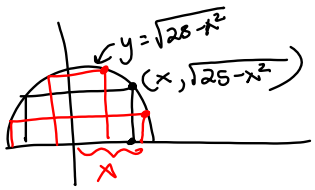
$\frac{dx}{dt} = 3$ cm/s

$\frac{dV}{dt} = ?$ when $x = 10$cm

$\frac{dV}{dt}$ cm^3/s

$V = x^3$

$\frac{dV}{dt} = 3x^2 \cdot \frac{dx}{dt}$



$A(x) = \underbrace{(2x)}_{\text{width}}\underbrace{\sqrt{25-x^2}}_{\text{height}} = (2x)(25-x^2)^{1/2}$

$A'(x) = 2(25-x^2)^{1/2} + (2x)\left(\frac{1}{2}(25-x^2)^{-1/2}\right)(-2x)$

$A'(x) = 2\sqrt{25-x^2} - \frac{2x^2}{\sqrt{25-x^2}}$

$2\sqrt{25-x^2} - \frac{2x^2}{\sqrt{25-x^2}} = 0$

$2\sqrt{25-x^2} = \frac{2x^2}{\sqrt{25-x^2}}$

$2(25-x^2) = 2x^2$

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

$50 = 4x^2$

$\frac{50}{4} = x^2$

$\sqrt{\frac{50}{4}} = x$

$\frac{5\sqrt{2}}{2} = x$

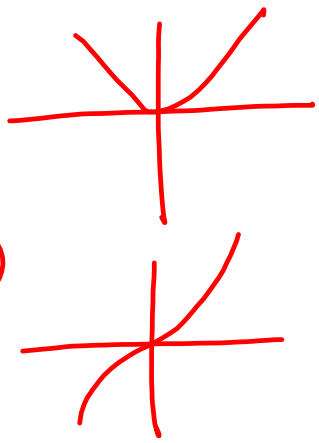
width: $5\sqrt{2}$

height: $\sqrt{25-\frac{50}{4}} = \sqrt{\frac{50}{4}} = \frac{5\sqrt{2}}{2}$

odd / even

f is even if $f(-x) = f(x)$

f is odd if $f(-x) = -f(x)$



7. $f'(-2) = 0$

$f(x) = x + \frac{K}{x}$

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

$f'(-2) = 1 - \frac{K}{(-2)^2} = 1 - \frac{K}{4}$

$1 - \frac{K}{4} = 0$

$K =$

$\frac{d^2}{dx^2}[f(x)] = f''(x)$

$[f(x^3)]' = f'(x^3) \cdot (3x^2)$

$g(x^3)$

$[f(x^3)]'' = f''(x^3) \cdot (3x^2) + f'(x^3) \cdot 6x$

$g'(x^3)$

$f(x^6) \cdot (3x^2) + g(x^3)\ 6x$

$$[f(x^3)]' = f'(x^3) \cdot 3x^2$$

$$= g(x^3) \cdot 3x^2$$

$$[f(x^3)]'' = [g'(x^3) \cdot 3x^2] \cdot 3x^2 + g(x^3) \cdot 6x$$

$$= f(x^6) \cdot 9x^4 + g(x^3)\, 6x$$