19.) $\sqrt[4]{16+h}$

$(16, 2)$

$y = \sqrt[4]{x}$

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

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

$y'(16) = \frac{1}{4 \cdot 16^{3/4}} = \frac{1}{32}$

$y - y_1 = m(x - x_1)$

$y - 2 = \frac{1}{32}(\overset{16+h}{x} - 16)$

$y = \frac{1}{32} \cdot h + 2$

17.) $y = \sqrt{4+\sin x}$

$(0, 2)$

$(.12, ?)$

$y' = \frac{1}{2}(4+\sin x)^{-1/2} \cdot \cos x$

$y'(0) = \frac{1}{2} \cdot 4^{-1/2} \cdot 1$

$= \frac{1}{4}$

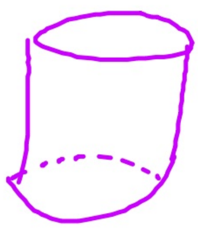
$y - 2 = \frac{1}{4}(x - 0)$

$y = \frac{1}{4} \cdot \frac{12}{100} + 2$

$= \frac{3}{100} + 2$

2.03

22.)



Minimize SA

$SA = 2\pi r h + 2\pi r^2$

$= 2\pi r \left(\frac{16}{r^2}\right) + 2\pi r^2$

$= \frac{32\pi}{r} + 2\pi r^2$

$V = 16\pi = \pi r^2 h$

$16 = r^2 h$

$\frac{16}{r^2} = h$

$SA' = -32\pi r^{-2} + 4\pi r$

$= \frac{-32\pi}{r^2} + \frac{4\pi r}{}$

$\frac{-32\pi + 4\pi r^3}{r^2}$

$r = 2$

2.) $y = x + \frac{k}{x}$

$y = x + kx^{-1}$

$y' = 1 - kx^{-2}$

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

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

$(-2)^2 - k = 0$

$4 = k$

2(e.) $x^2 + 2y = 0$ $(0, -\frac{1}{2})$

minimize distance

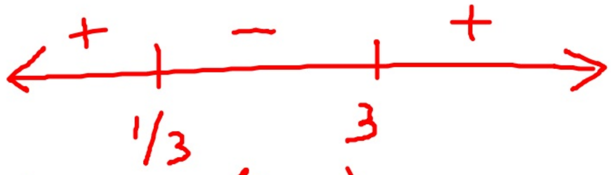
Taking the derivative of a function of x works. When you take the derivative of a funciton of y, the derivative produces only an imaginary solution.

3c.) $f(x) = x^3 - 5x^2 + 3x + K$

$(\_\_, 11)$
rel. min

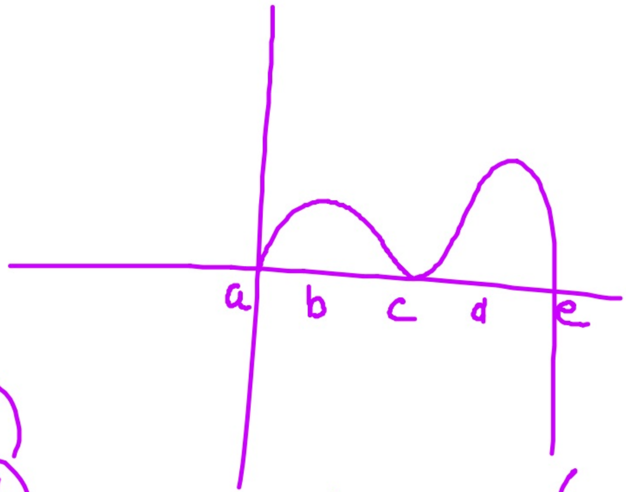
$f'(x) = 3x^2 - 10x + 3$

$0 = (3x - 1)(x - 3)$



rel. min $(3, 11)$

$11 = (3)^3 - 5(3)^2 + 3(3) + K$



vel. inc. (a, b)
(c, d)

speed incr. $(a, b), (c, d)$
(e, ∞)

speed decr. $(b, c), (d, e)$