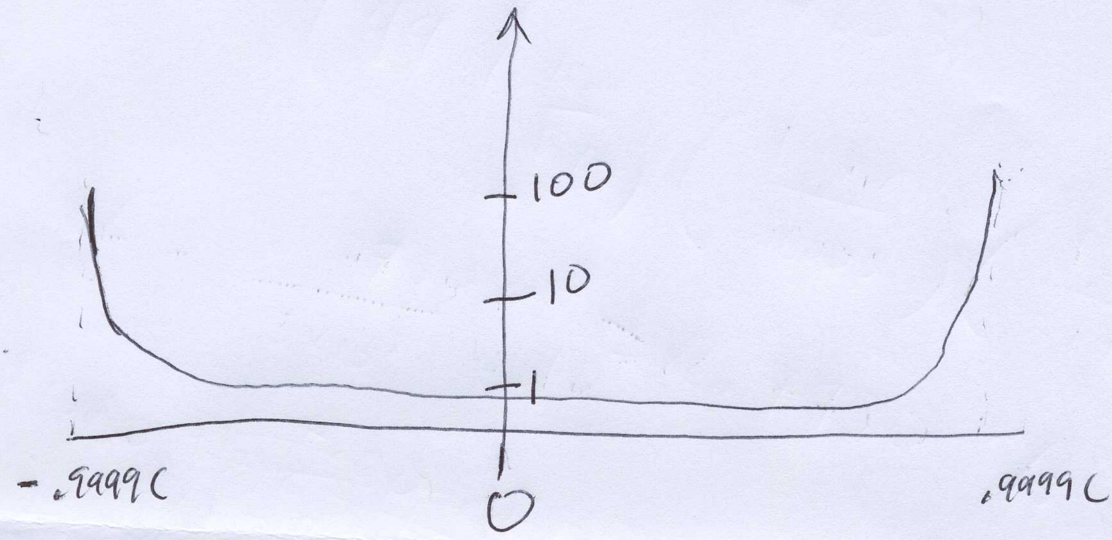
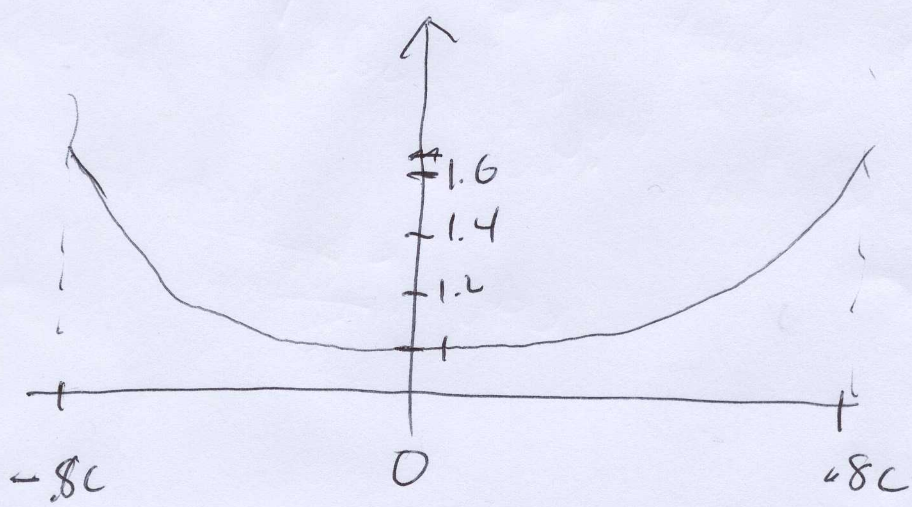
HW 3

(3) (a) $\gamma = \dfrac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$





☆ These figures are for order of magnitude estimates, and should be symmetric about $V=0$.

~~HB~~
HW3

(3)

b) $\left(99.9 \frac{km}{hr}\right)\left(\frac{1\ hr}{3600 s}\right)\left(\frac{1,000 m}{1 km}\right) = 27.750 \ m/s$

$\frac{v}{c} = \frac{27.750}{3 \times 10^8} \sim 10^{-8}$

$\gamma = \frac{1}{\sqrt{1-10^{-16}}} = \underbrace{1.00 \ldots 05}_{17 \text{ zeros}}$

from the clerk's point of view:

you are 10 Km away travelling at 99.9 Km/hr, so the total trip time (as seen by him) is about 6 minutes. Your clock's duration reads $\frac{6}{\gamma}$ minutes, thus your clock is slow by

$\frac{6}{\underbrace{1.00 \ldots 05}_{17 \text{ zeros}}} - 6 = \underbrace{-.00 \ldots 03}_{15 \text{ zeros}}$ minutes

(c)

now

$$\gamma = \frac{1}{\sqrt{1-\left(\frac{99.9}{100}\right)^2}} \approx 22$$

$$\frac{6}{22} - 6 = -5.7 \text{ minutes}$$