

4. (a) We find β from $\gamma = 1/\sqrt{1 - \beta^2}$:

$$\beta = \sqrt{1 - \frac{1}{\gamma^2}} = \sqrt{1 - \frac{1}{(1.01)^2}} = 0.140371 \approx 0.140 .$$

- (b) Similarly, $\beta = \sqrt{1 - (10.0)^{-2}} = 0.994987 \approx 0.9950$.

- (c) In this case, $\beta = \sqrt{1 - (100)^{-2}} = 0.999950$.

- (d) This last case might prove problematic for some calculators. The result is $\beta = \sqrt{1 - (1000)^{-2}} = 0.99999950$. The discussion in Sample Problem 38-7 dealing with large γ values may prove helpful for those whose calculators do not yield this answer.