Set 10 – 12 April

"The secret to creativity is knowing how to hide your sources." – A. Einstein

1) [20 points] Jackson 12.6. Instead of part (a), show that a Lorentz transformation can be made, to go to a frame where $\vec{B}'$ and $\vec{E}'$ are parallel, and that the boost velocity satisfies the equation

$$\frac{\vec{\beta}}{1+\beta^2} = \frac{\vec{E}\times\vec{B}}{E^2+B^2} \tag{1}$$

As a hint, you can start by arguing that the boost velocity is $\vec{\beta} = \lambda(\vec{E}\times\vec{B})$ at the beginning of your calculation, and then determine λ.

In part (b), note the Jacksonian phrase "with appropriate constants of motion."

2) [20 points] Jackson 12.3. In part (b) I obtained

$$\frac{eE_0x}{\gamma_0 mc^2} = \cosh(\frac{eE_0y}{\gamma_0 v_0 mc}) - 1 \tag{2}$$