Physics 851 Quiz #6 - Friday, Nov 8th

Consider a system in initial state i, with energy ϵ_i, which can decay to a final state f, with energy ϵ_f, via a matrix element

$$V_{fi}(t) = A \exp\left(-\frac{t^2}{2\tau^2}\right).$$

1. (10 pts) To lowest order in perturbation theory, derive the probability that the state is in the state f at time $t = +\infty$ given that the particle was in state i at $t = -\infty$.

2. (10 pts) To this order, calculate the rate at which the state i is transitioning to f at t=0.

3. (5 pts) Express #2 in the limit $\tau \to \infty$.