ECON 201, Prof. Hogendorn: Problem Set #10

1. A landfill company is considering the purchase of ten better garbage trucks. Each truck costs $50,000 and will last for seven years, after which its resale value is 0. During each year, the ten trucks combined will reduce the company's other costs by $100,000. If the discount rate for the company is 10%, should it buy the trucks? What if the discount rate were 8%?

2. The Glendivot distillery makes Scotch and then stores it for a period of time before selling it. The market price of a barrel of Glendivot is

$$V(t) = 480t - 12t^2$$

   where t is the number of years of aging.

   (a) The distillery produces a private reserve which is consumed only by the owner's family. The objective is to produce the highest possible value Scotch without reference to costs. How long is the private reserve aged?

   (b) The distillery also produces its regular product for commercial sale. Its faces an interest rate of 5%, compounded continuously. How many years does it age its regular product?

   (c) Suppose the market for Scotch is perfectly competitive and in long run equilibrium with no entry or exit of firms (a dubious assumption, but let's go with it). Assume there is only one cost the distillery incurs: the cost of distilling a barrel's worth in the first place. How much does it cost to distill a barrel? (Note: ignore the private reserve; that is private consumption by the owner.)

3. You can invest in a forest by paying $1,000, and if everything goes well, you will get sell the trees for a present value of p. (Note this problem is not about when to cut the trees; it's given that they will be worth p when you cut them.) Put another way, the return when the forest is successfully cut is $\frac{p-1000}{1000}$. However there is a 5% chance the forest is destroyed by an ice storm, in which case the trees are completely ruined and return -100%.

   Rather than planting a forest, you can also purchase a risk-free asset that returns 5% or you can invest in a diversified mutual fund that returns 10% with a standard deviation of 25%.

   Assuming that the market for logs is in long-run equilibrium, what is p? It will help you to know that the standard deviation of the return on the forest is $\frac{0.218p}{1000}$.