

# NE150 Homework 1

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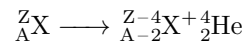
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## 1 Problem 1

Types of spontaneous nuclear decay:

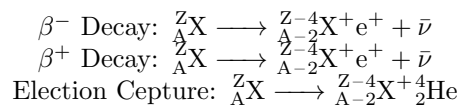
### 1.1 Alpha Decay

Dominant decay for high Z nuclei, results in the ejection of a He-4 (Alpha Particle) from the nucleus.



### 1.2 Beta Decay

There are three types of beta decay:  $\beta^-$ ,  $\beta^+$ , and Election Capture. These exchange a proton for a neutron, or vice versa in the nucleus. A  $\beta$  particle is ejected as a neutreino or anti neutrino. Election capture involves the capture of an orbital election to convert a proton in the nucleus.



### 1.3 Gamma decay

Gamma decay is caused by the deexcitation of the nucleus...

## 2 Problem 2

$$A = A_0 e^{\lambda t}$$

Solve for  $t$  at  $A = A_0 * .1$  and  $\lambda = 1.33e^{-7}s^{-1}$

$$t = 12341234$$

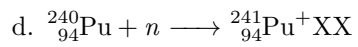
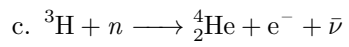
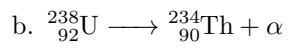
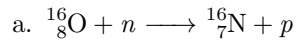
First calculate the half life of the isotope:

$$\begin{aligned} T_{1/2} &= \ln(2)/\lambda \\ T_{1/2} &= 1234 \end{aligned}$$

The time to reach .1 initial activity is

### 3 Problem 3

### 4 Problem 4



### 5 Problem 5

### 6 Problem 6

### 7 Problem 7

### 8 Problem 8

### 9 Problem 9

### 10 Problem 10