Definite Integrals of Power Functions

The purpose of this exercise is to write the user-defined **R** function `Power.Integrator.R` that calculates the value of the definite integral

$$\int_a^b A_1 x^{p_1} + A_2 x^{p_2} + \cdots + A_n x^{p_n} dx.$$

Your inputs will be the vector of coefficients $[A_1, A_2, \ldots, A_n]$, the vector of exponents $[p_1, p_2, \ldots, p_n]$, the lower limit a, and the upper limit b. In that order.

You must ensure that your function works when one of the exponents equals -1. Remember that the antiderivative of x^{-1} equals $\ln(x)$. Also, the **R** command for $\ln(x)$ is $\log(x)$.

If the length of the coefficient vector is not equal to the length of the vector of exponents, your function should give an error message and return `NA`.

Here are several examples.

```
> Power.Integrator(c(1,2),3,0,1)
The length of the coefficient vector must equal the length of the vector of exponents.
[1] NA
> Power.Integrator(2,0,-2,2)
[1] 8
> Power.Integrator(c(1,-2),c(3,1),-1,2)
[1] 0.75
> Power.Integrator(c(5,-2,3),c(0,1,2),1,4)
[1] 63
> Power.Integrator(1,1/2,1,9)
[1] 17.33333
>
> Power.Integrator(c(1,-1),c(1/2,-1/2),1,9)
[1] 13.33333
> Power.Integrator(1,-1,1,10)
[1] 2.302585
> Power.Integrator(1,-2/3,1,8)
[1] 3
> Power.Integrator(c(4,-1),c(1/2,3/2),0,4)
[1] 8.533333
> Power.Integrator(c(4,1),c(-3,-1),1,2)
[1] 2.193147
> Power.Integrator(c(1,-1,1/2,-1/6,1/24,-1/120),c(0,1,2,3,4,5),0,4)
[1] -1.155556
```