Study Question – Expected utility

1. You must help Julia Roberts choose one of two payment options for her next movie[1]:

option 1: $10,000,000
option 2: $5,000,000 plus 5% of gross ticket revenue

You estimate Julia Roberts' utility function as:

total utility = $I^{.95}$ where "I" is income

You (and Julia) forecast the performance of the movie as:

$50,000,000 gross ticket revenue: 20% likelihood
$100,000,000 gross ticket revenue: 50% likelihood
$150,000,000 gross ticket revenue: 30% likelihood

(45 points) Using your vast knowledge of choice under uncertainty, which option should Julia choose? Thoroughly support your recommendation with the appropriate calculations. (Your grade depends almost entirely upon these calculations.)

[1] Ignore differences in tax implications and payment timing.

We must compare Julia's expected utility under the two options.

Expected utility = sum of (probability of event times utility from event)

Option 1: Julia's expected utility = $1[10{,}000{,}000^{.95}] = 4{,}466{,}836$ utils

Option 2: Julia's expected utility =

$$.20[(5{,}000{,}000 + .05(50{,}000{,}000))^{.95}] +$$
$$.50[(5{,}000{,}000 + .05(100{,}000{,}000))^{.95}] +$$
$$.30[(5{,}000{,}000 + .05(150{,}000{,}000))^{.95}]$$

$= 4{,}569{,}629$ utils

Julia should choose option 2.