Reading: Fisher.AggExcess Fisher_UniTableM (Problem 1)
Model: Source text
Problem Type: Calculate the Table M charge and insurance charge from first principles given a uniform aggregate loss distribution.

Given

A ~ Uniform [0, 100]	Aggregate loss distibution
50	Expected aggregate loss

Find Calculate the Table M Charge and insurance charge for the following actual losses.

A	Table M charge	Insurance Charge
40	?	?
50	?	?
60	?	?

Solution

Although the problem can be solved using a Lee diagram, we'll solve it with what we know from first principles.
By doing several problems like this you'll be able to apply the technique to any aggregate loss distribution the CAS may give you.

Insurance charge $= E \cdot \phi(r)$

Clearly, we need to form entry ratios. Remember, the (Table M) entry ratio is A / E, where A is the actual loss and E is the expected loss.

A	Entry Ratio
40	0.8
50	1.0
60	1.2

Table M Charge: $\phi(r) = \int_r^\infty (y - r)\mathrm{d}F(y)$

Alice: "Important detail: Let Y = A / E and let F be the cumulative distribution function of Y."

Since the expected loss is a scalar, namely 50, we scale the cumulative distribution for A by dividing it by this amount.
Since A is defined uniformly on [0, 100], this means Y = A / E is defined uniformly on [0, 2] (and is zero everywhere else).

Now we know the distribution for Y, we can write $F(y) = \frac{1}{2}y$ and so $\mathrm{d}F(y) = \frac{1}{2}\mathrm{d}y$

We'll illustrate plugging this into the Table M Charge formula for r = 0.8:

$$\phi(0.8) = \int_{0.8}^{2} (y - 0.8) \cdot \frac{1}{2}\mathrm{d}y = 0.36$$

The associated insurance charge at r = 0.8 is then $E \cdot \phi(0.8) =$ 50 * 0.36 = 18

Using the same process with the remaining entry ratios results in the following completed table.

A	Table M charge	Insurance Charge
40	0.36	18
50	0.25	12.5
60	0.16	8

Alice: "For those of you also reviewing the source, you'll see a similarity with Fisher's Chapter 3 Question 3. However, in the text (top p. 40) Fisher muddies the water by saying the insurance charge refers to an amount, not a ratio but then in Q3 asks the reader to find the ill-defined Table M insurance charge', which the solution shows is actually just the Table M Charge (i.e. a ratio), not the insurance charge."