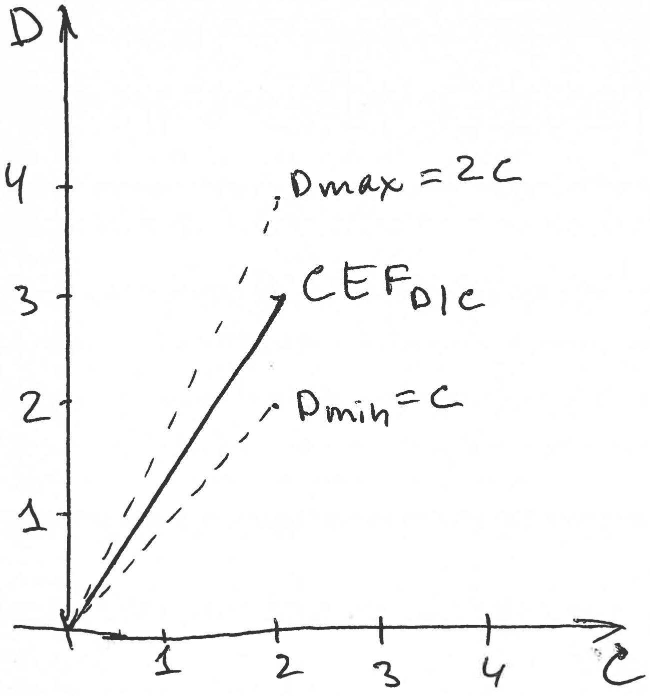

3.1 Given uniformity of both distributions

$$E[D|C] = \frac{c}{2} + c$$

3.2 In 2.2. I showed, that for a uniform distribution $U(a,b)$

$$V[U(a,b)] = \frac{(b-a)^2}{12} \Rightarrow$$

$$V[D|C] = \frac{(2c-c)^2}{12} = \frac{c^2}{12}$$

3.3 Using Law of Total Variance (FOAS 2.2.18):

$$V[D] = E[V[D|C]] + V[E[D|C]] = E\left[\frac{c^2}{12}\right] + V[1.5c].$$

Given the uniformity of C on $[0;2]$, marginal distribution of c $f_c = 0.5$. Using expectation of a function (FOAS 2.1.5)

$$E\left[\frac{c^2}{12}\right] = \int_0^2 f_c \cdot \frac{c^2}{12} dc = \frac{1}{24}\int_0^2 c^2 dc = \frac{1}{24}\left.\frac{c^3}{3}\right|_0^2 = \frac{8}{24 \cdot 3} = \frac{1}{9}$$

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again, using the result from 2.2 of this test:

$$V[1.5c] = 2.25\,V[C] = 2.25\,V[U(0,2)] = 2.25 \cdot \frac{2^2}{12} = \frac{9}{4} \cdot \frac{1}{3} = \frac{3}{4}$$

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Putting it together:

$$\boxed{V[D] = \frac{1}{9} + \frac{3}{4} = \frac{31}{36}}$$