

Ex: A real number X is chosen as follows: Flip a fair coin, if head,
 $X = \frac{1}{2}$
 if tail: use a computer to pick randomly from $(0, 1)$

Q: $F_X(x) = ?$

Ans:

Advantage

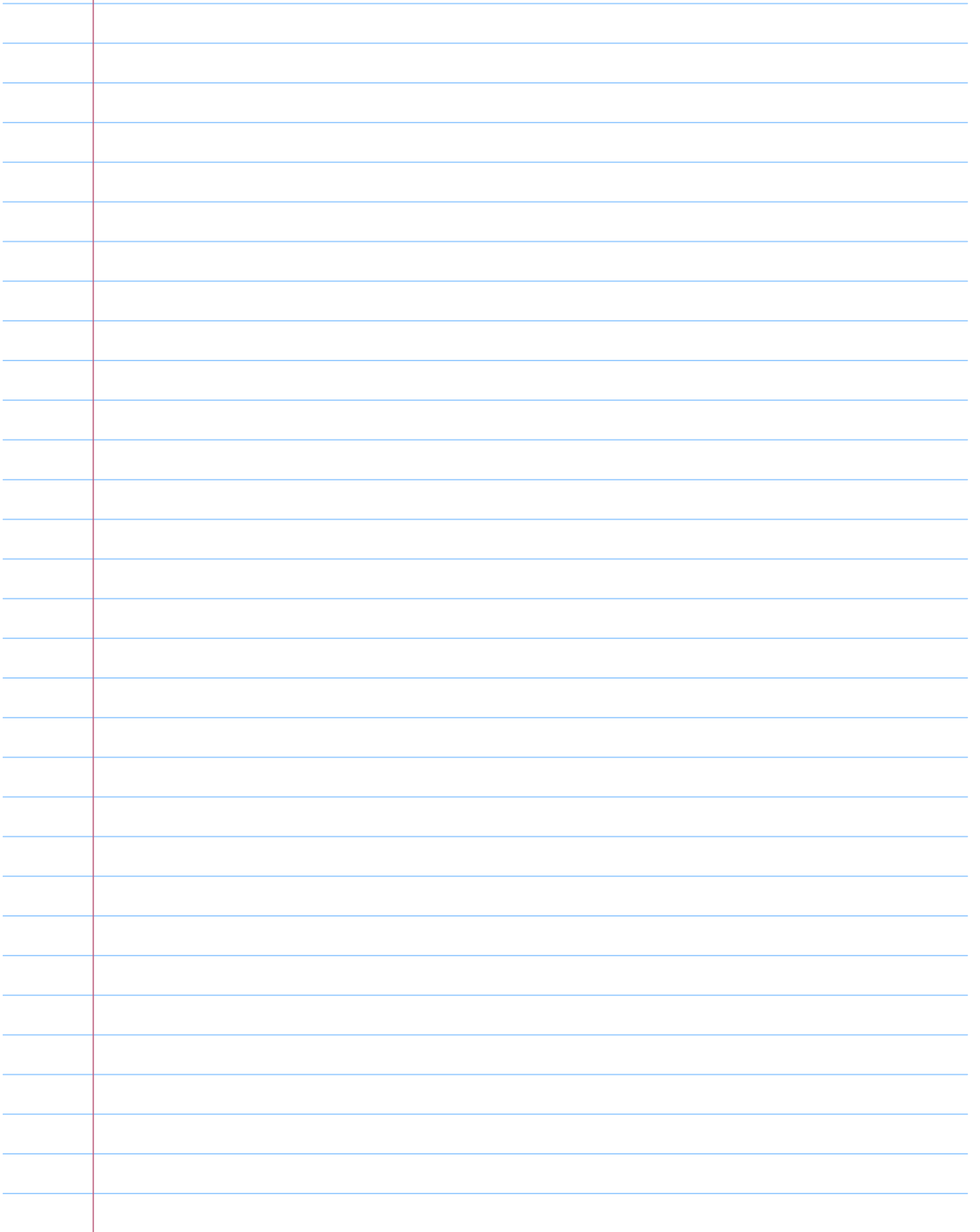
④ Find the pmf/pdf of a new
R.V $Y = f(X)$.

Ex: Similar to HW6 Q11, Q12
 X is uniformly chosen from
 $[0, 2]$

$$Y = X^2$$

Find the pdf of X and Y .

Ans:



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Using cdf to find new pdf is very important. One more example:

HW6 Q12

Q: X is chosen uniformly from $(0,1)$

$$Y = \frac{-\ln(X)}{\lambda} \quad \text{for some } \lambda > 0$$

Find out the cdf & the pdf of Y .

Ans:

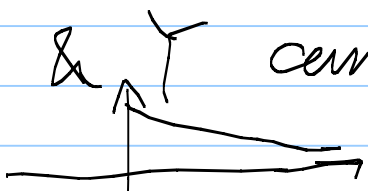
Q: What type of R.V.s is Y ?

Ans:

Q: Why this is an important question?

Ans: Computer knows how to generate a uniform R.V.s. X between $(0, 1)$ ex: "rand()" in MATLAB.

By taking $Y = -\frac{\ln(X)}{\lambda}$, the Y is an exponential R.V. with more Y 's closer to zero, & Y can be extremely large



Advantage \rightarrow discrete / conti

⑤ For positive R.V.s (those X with $P(X < 0) = 0$)

$$E(X) = \int_0^{\infty} (1 - F_X(x)) dx$$

Ex: The $F_X(x)$ of an exponential R.V. is $\boxed{1 - e^{-\lambda x}}$

Q: $E(X)$