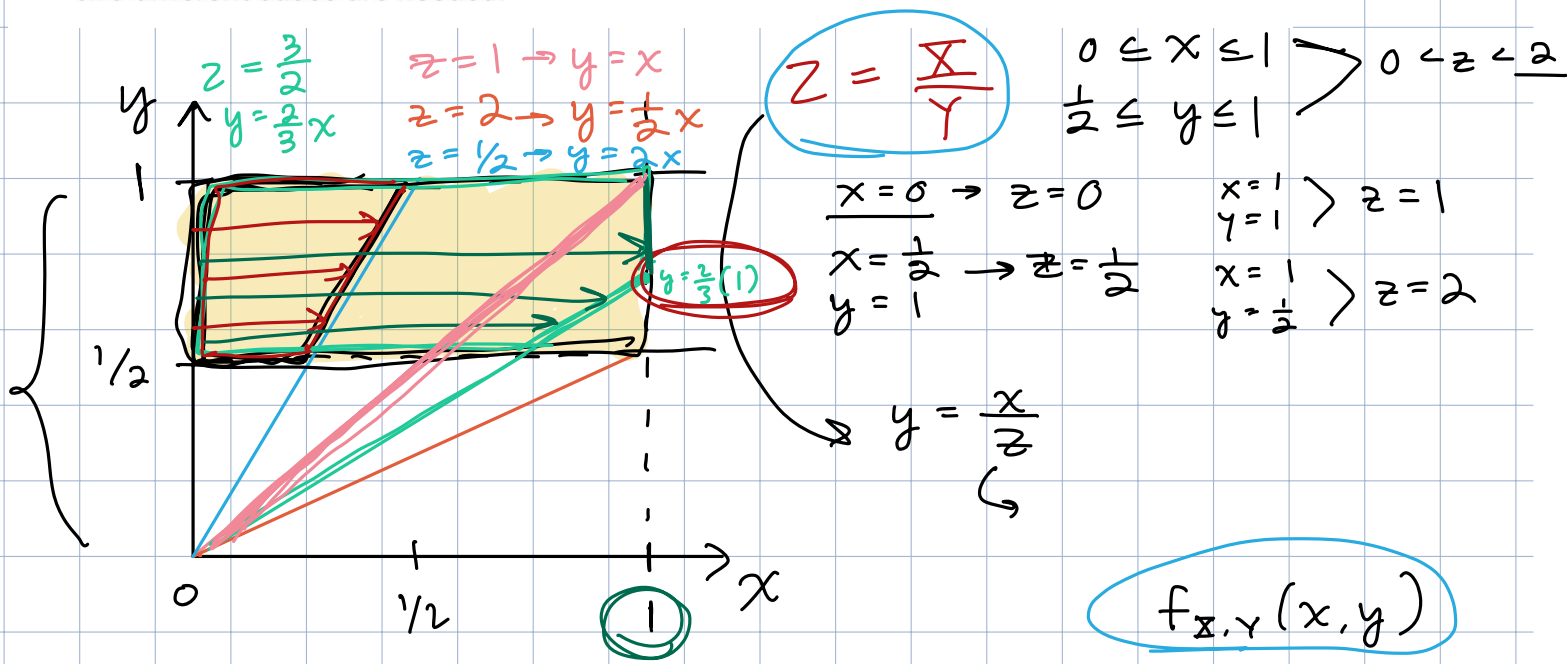


NTB #3

27.12 b & c

3. Suppose that the random variables X and Y have joint density $f_{X,Y}(x,y)$, for $0 < x < 1$, and $\frac{1}{2} < y < 1$. Set up the equation for the cdf of Z , where $Z = X/Y$.

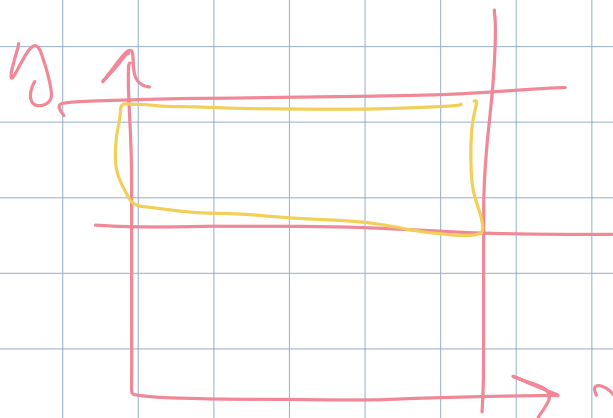
Hint: First determine what the possible values for Z are. Then make a sketch of the domain of the joint pdf and shade in the region representing the cdf of Z for different values of z . Make sure to pay close attention to how the region we need to integrate over changes as z changes. The cdf has two different cases depending on the value of z . Plug in specific values of z and shade in the region representing the cdf to see why two different cases are needed.



$$P(Z \leq z) = P\left(\frac{X}{Y} \leq z\right)$$

joint pdf for X & Y

but transf. Z will dictate domain space (of INT) and the bounds for int



$$z = y + x$$

$$y = z - x$$

$$f_X(x) = \int f_{X,Y} dy$$

$$f_{X,Y}(x,y) = \text{[scribbled out]}$$

$$f_X(x) = \text{[scribbled out]}$$

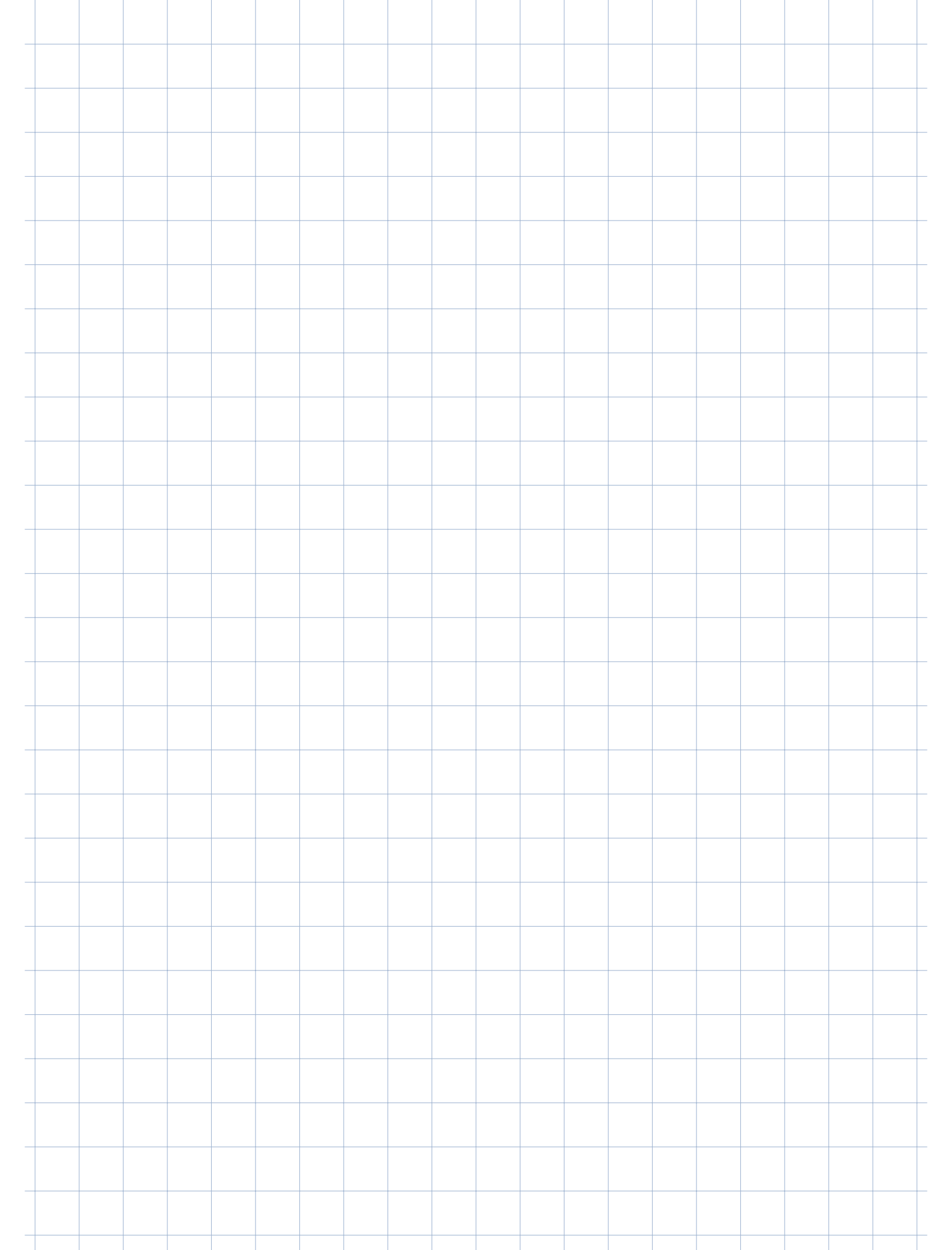
$$f_Y(y) = \text{[scribbled out]}$$

$$z = \frac{x}{x} =$$

$$f_z(z) = \frac{f_x(x)}{f_y(y)} = \frac{c}{d}$$

$$z = x \cdot y$$

Exercise 32.10. Let X be uniform on $[0, 10]$. Let Y be exponential with $\mathbb{E}(Y) = 5$. Find $P(X < Y)$.



If I give a RV w/ known mean & variance, can you calculate the mean & variance of its transformation?