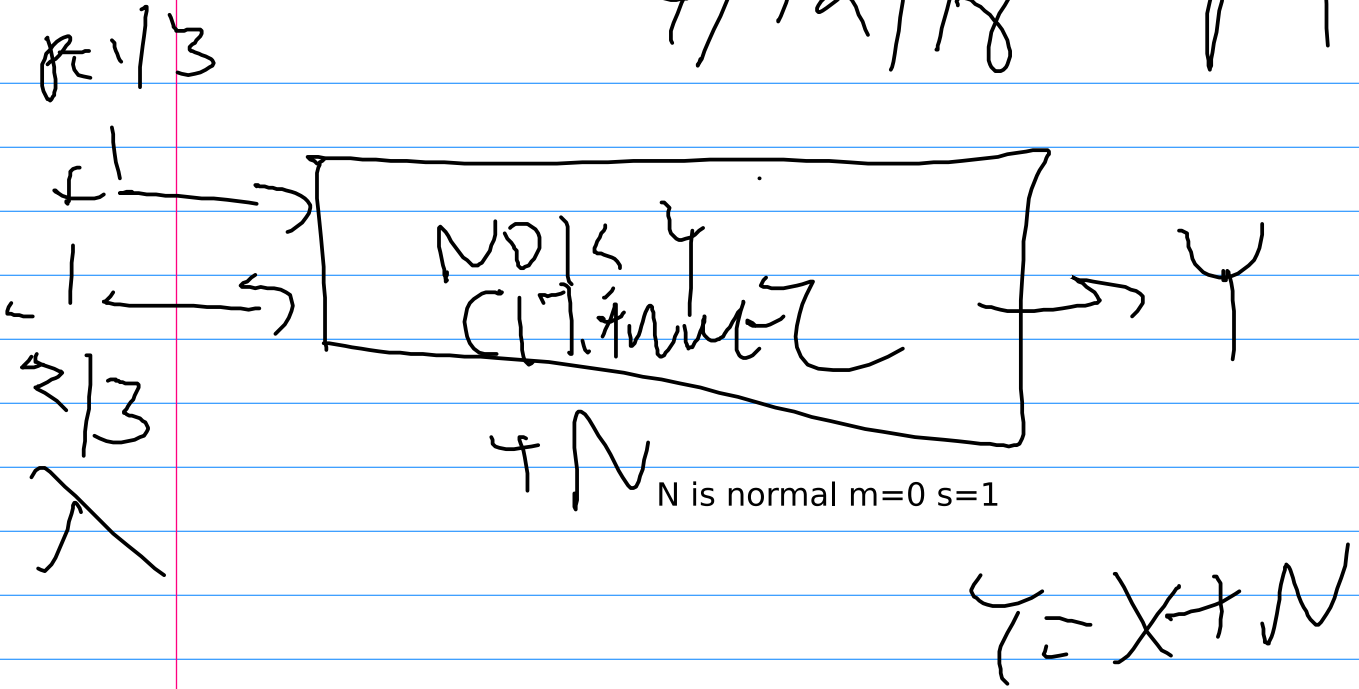
4/12/18 p1



You see Y, which is continuous.   What's your best guess for X?

We did that Mon.

New: What's the best divide for y, to separate x=-1 from x=1?

Notes on 5.35   P[A|B] P[B] = P[A and B]

Easier version of 5.40: sum of 2 independent normal r.v.

X: N(0,1)   Y: N(0,1)   Z=X+Y

We want f_Z(z)   convolve (works because they're indepdendent)

$$f_X(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

$$f_Y(y) = \frac{1}{\sqrt{2\pi}} e^{-\frac{y^2}{2}}$$

$$f_Z(z) = \int f_X(x) f_Y(z-x)\, dx$$

$$= \frac{1}{2\pi} \int e^{\frac{-x^2-(z-x)^2}{2}}\, dx$$

$$-x^2 - z^2 - x^2 + 2zx$$

$$= -2x^2 + 2xz - z^2$$

$$\div 2 \quad -x^2 + xz - \frac{z^2}{2}$$

$$= -x^2 + xz - \frac{z^2}{4} - \frac{z^2}{4}$$

$$e^{-\frac{x^2}{2\sigma^2}}$$

$$= -\left(x - \frac{z}{2}\right)^2 - z^2/4$$

$$f_Z(z) = \frac{1}{\sqrt{4\pi}} e^{-z^2/4} \underbrace{\frac{1}{\sqrt{2\pi \cdot \frac{1}{2}}} \int e^{-\frac{\left(x-\frac{z}{2}\right)^2}{2\cdot\frac{1}{2}}}\, dx}_{=1}$$

$$f_Z(z) = \frac{1}{2\sqrt{\pi}} e^{-z^2/4}$$

$$= N(0, \sqrt{2})$$

The sum of two indep normal r.v. with s=1 is a normal r.v. with s=sqrt(2)

The book exercise assumes they're correlated.

If indep, then the variances add.   for normal.

If they're dependent, there's a range.

One extreme: Y=-X.   What is Z=X+Y?   Z=0

=XY Other extreme Y=X   Z=2X   s=2

Non normal dist, e.g., Y=X^ 2.   Not do that now.