EE 503
Lecture # 20
1 November 2016

Midterm #2 – posting –
covers up to and including CLT
and Poisson approximation to Binomial
up to and including Lecture 19 page 9.

Advance Reading Ch. 6 <u>Vector RVs</u>
6.3.3 only a little
OMIT 6.3.4
6.6
Read App. C – Matrices + Linear Algebra

From Example 2

$$p(|X-m| \geq 2\sigma) \leq 1/4 = 0.25$$ in general

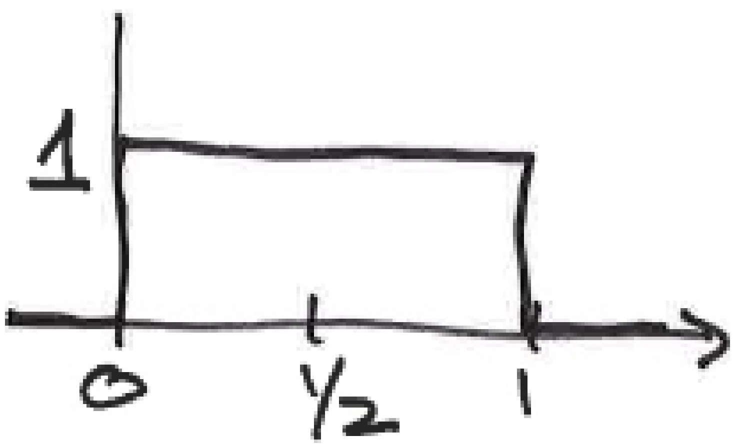
suppose X is a uniform $[0,1]$ RV

$m = 1/2 \qquad \sigma = \frac{1}{2\sqrt{3}} = 0.289$

$2\sigma = 0.577$

$$p(|X-m| \geq 2\sigma) = p\left(|X-1/2| \geq \frac{1}{\sqrt{3}}\right)$$

$$= p\left(|X-1/2| \geq 0.577\right) = \underline{\underline{0}}$$



Chebyshev is most useful for smooth, unimodal pdfs.

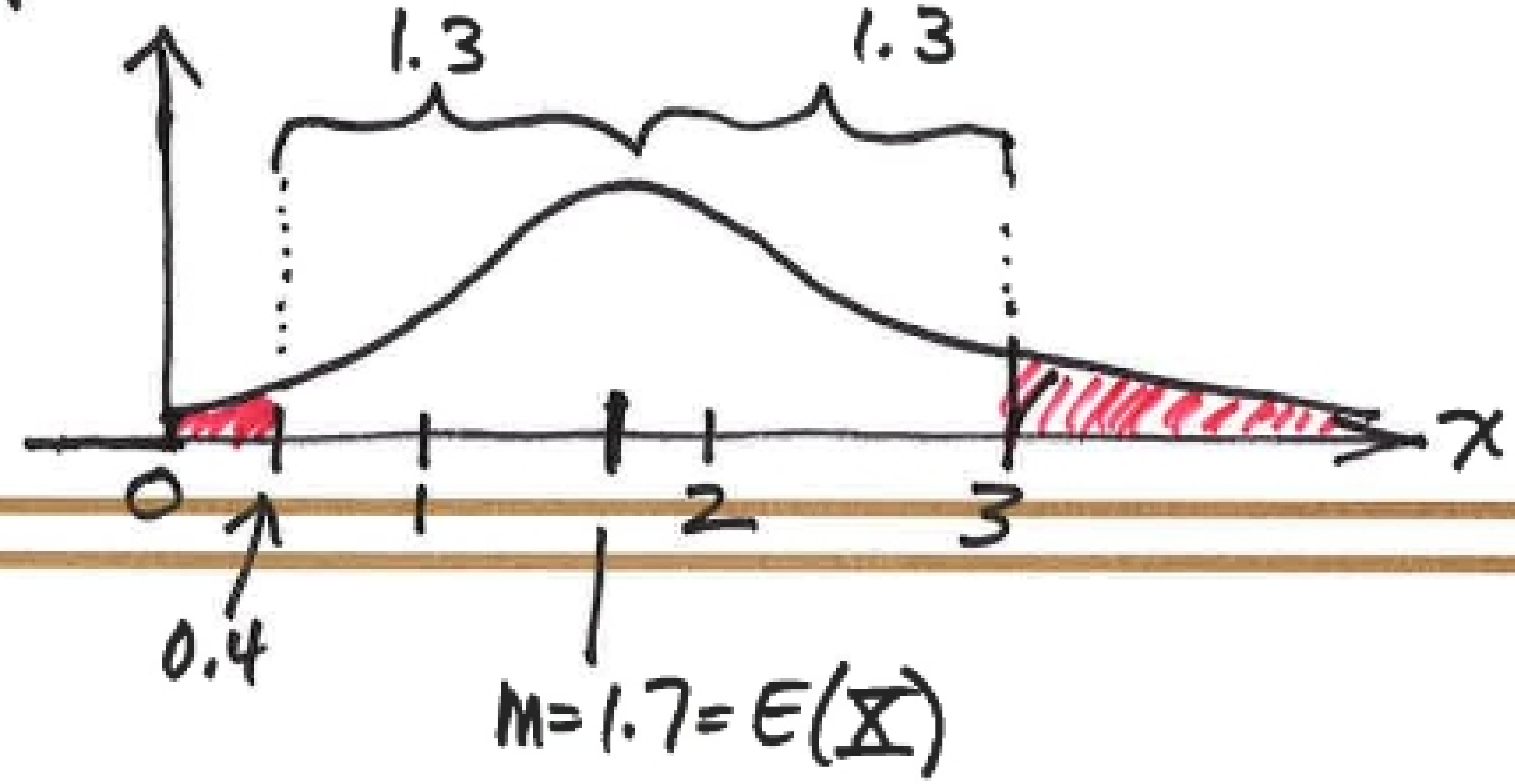
Note if $\sigma_X = 0 \quad p(|X-m| \geq t) = 0$ for all t

so $p(X=m) = 1$

Revisit the EE 503 student height problem $E(X) = 1.7$ add: $\sigma_X = 0.3$

find $P(X > 3)$ start with Chebyshev

$$P(|X - 1.7| \geq 1.3) \leq \left(\frac{0.3}{1.3}\right)^2 = 0.0533$$



$$P(X \leq 0.4) + P(X \geq 3) \leq 0.0533$$

$$P(X \geq 3) \leq 0.0533 - P(X < 0.4)$$

we don't have this, assume the worst case:

$P(X < 0.4) = 0$

$P(X > 3) \leq 0.0533$

$\Rightarrow$ from Chebyshew

$P(X > 3) \leq 0.57$ (Markov)