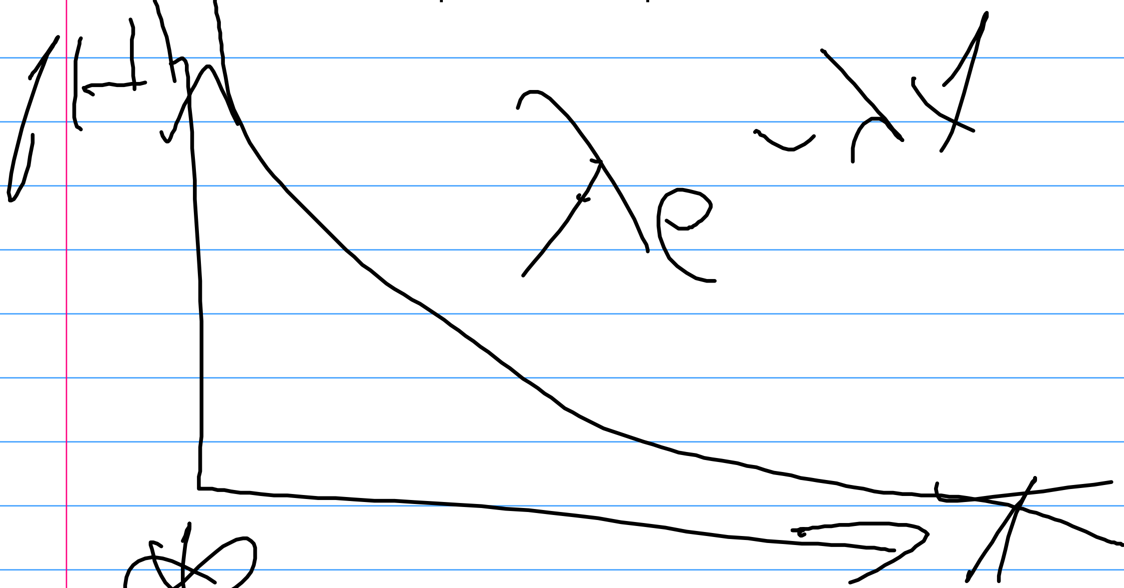
example of conditional pdf: stock option.



$$\int_0^\infty f(t)\,dt = 1 \;?$$

$$\int \lambda e^{-\lambda t}\,dt$$

$$= \frac{\lambda e^{-\lambda t}}{-\lambda}\Bigg|_0^\infty$$

$$= \underset{1-0}{e^{-\lambda 0} - e^{-\lambda\infty}} = 1 \;\checkmark$$

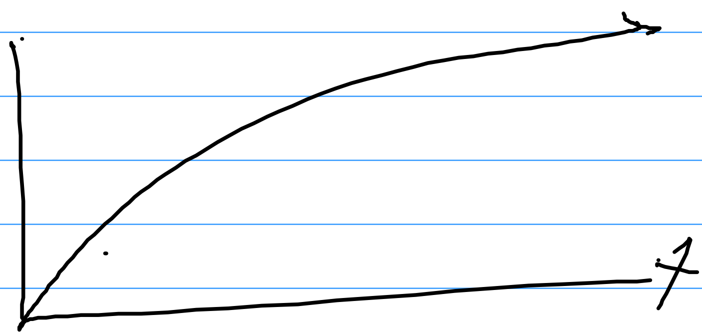
2

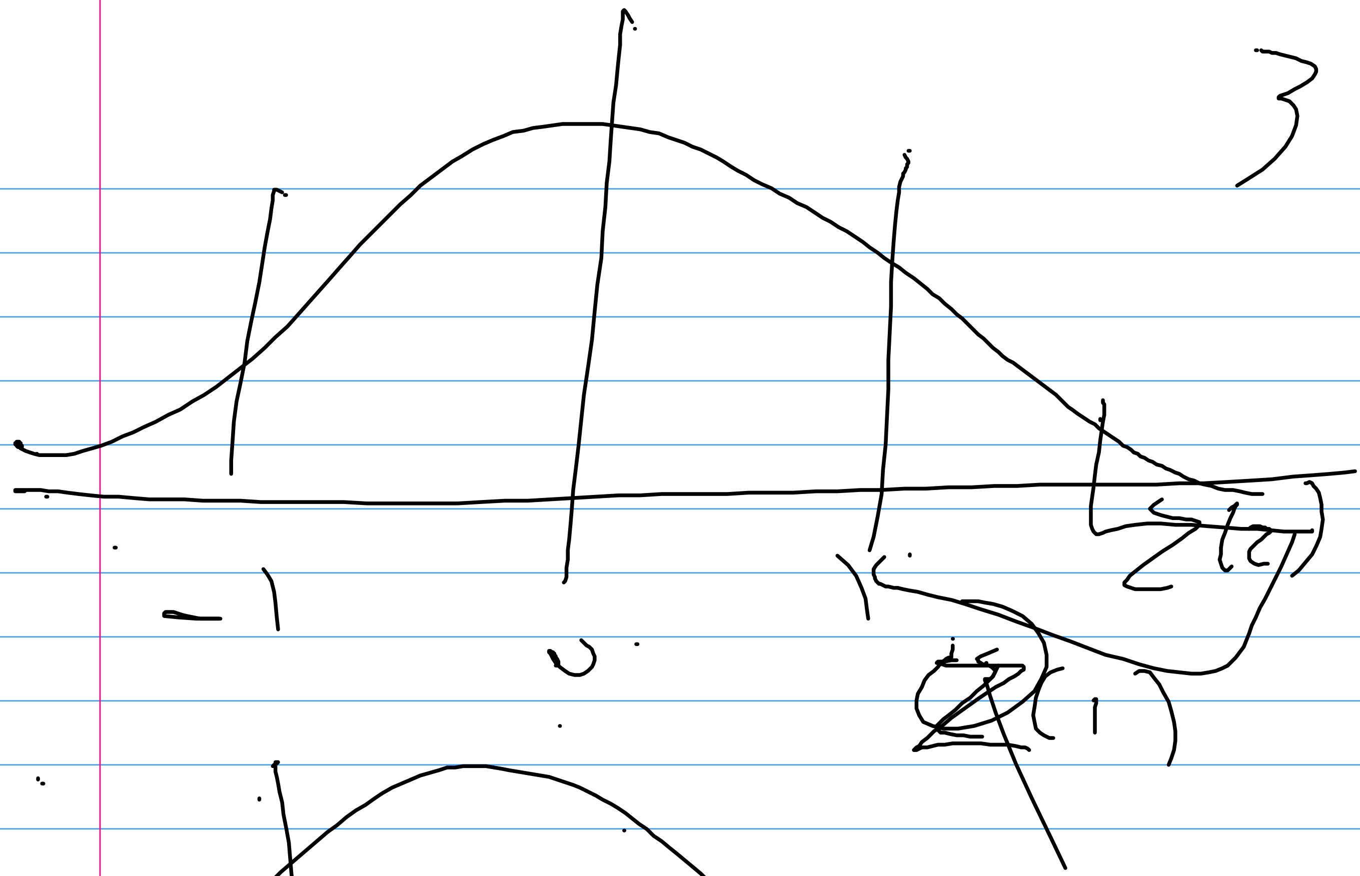
$$F(x) = \int_0^x \lambda e^{-\lambda t}\,dt$$

$$= \frac{\lambda e^{-\lambda t}}{-\lambda}\Big|_0^x = 1 - e^{-\lambda x}$$

$F(t)$

cdf.





$z < 4.24$

r.v. is time until widget dies.   Assume it's exponential. (not realistic).
want prob at least 1 of 3 widgets is still alive in 6 months.

continue this Thurs.

X is r.v. for person's height in meters.   Making things up.

Assume X is uniform in [.7, 1.3]

$f_X(x) = 1/6$ if $.7<x<1.3$
0 otherwise

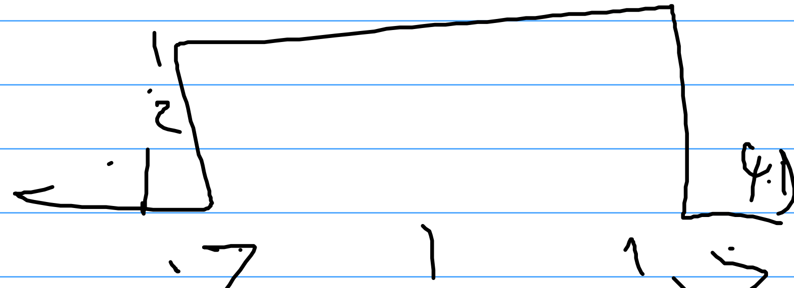
We want to use ft not meters.
Define new r.v. $Y = X * 3.3$

we want $f_Y(y)$? $f_Y(y) = f_X(X*3.3) / 3.3$

eg. prob height between 1 and 1.1m = .017
prob height between 5.9 and 6 ft: use scale

Use ft and yards (1 yard =3 ft)

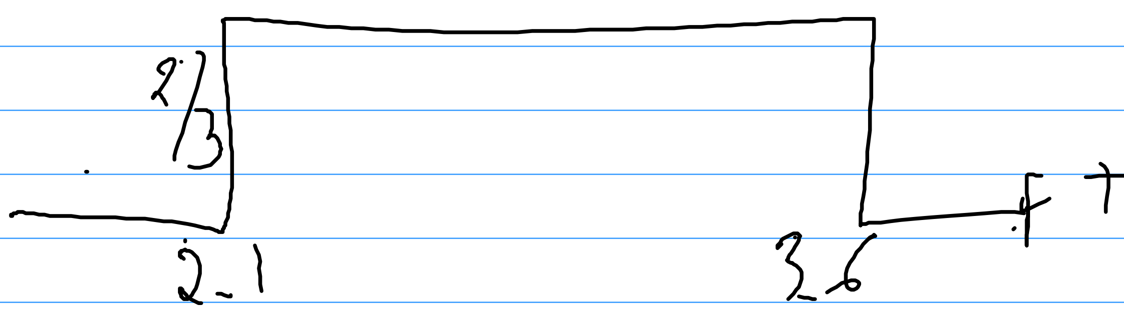
X is r.v. for height in yards. Continuous dist.
X uniform in [.7 , 1.2]
$f_X(x) = 2$ if x in .7 .. 1.2
0 otherwise



$\text{Prob}[x<X<x+d] = f_X(x)\, d$
$\text{Prob}[1<X<1.1] = 2 * .1 = .2$

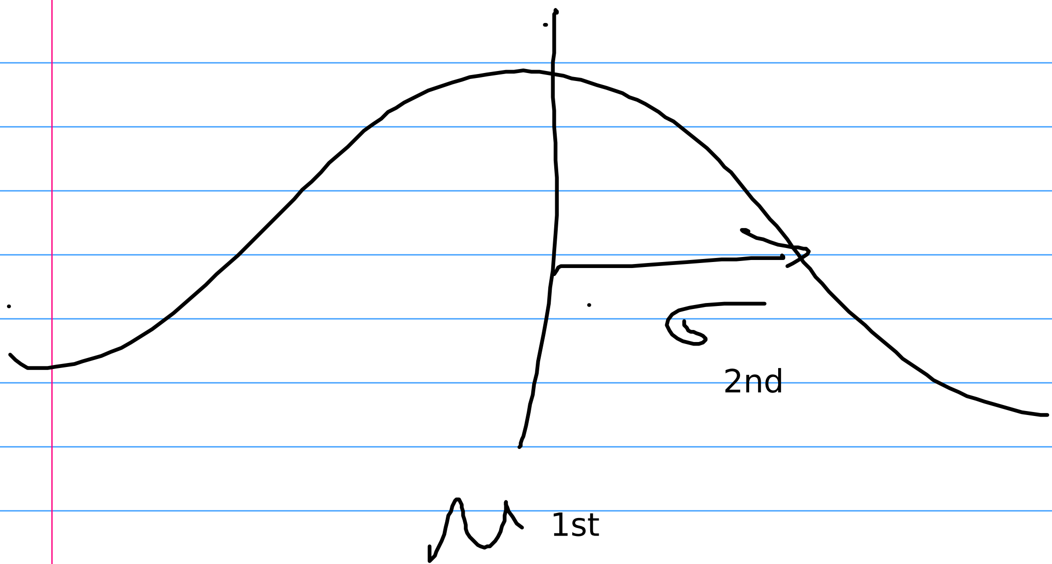
Want to use ft not yards.   Define new r.v. $Y=3X$

$f_Y(y) = f_X(y/3)/3 = 2/3$ if $2.1<y<3.6$ eqn 4.67 on p 177

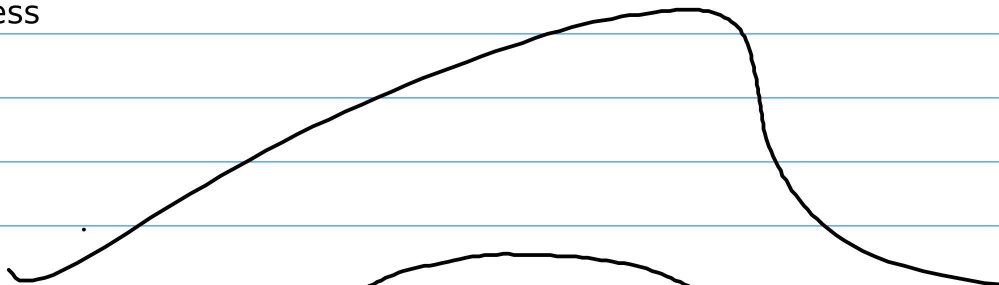


P[height between 3 and 3.3 ft] = 2/3 * .3 = .2.

moments ctd



3rd: skewness



4th kurtosis how boxy it is

Some senior ECSE courses use transforms.