can take any value in some range – MEASUREMENTS

Prob. Density Function

$X \sim f(x)$

$P(a \leq X \leq b) = \int_a^b f(x)\,dx$

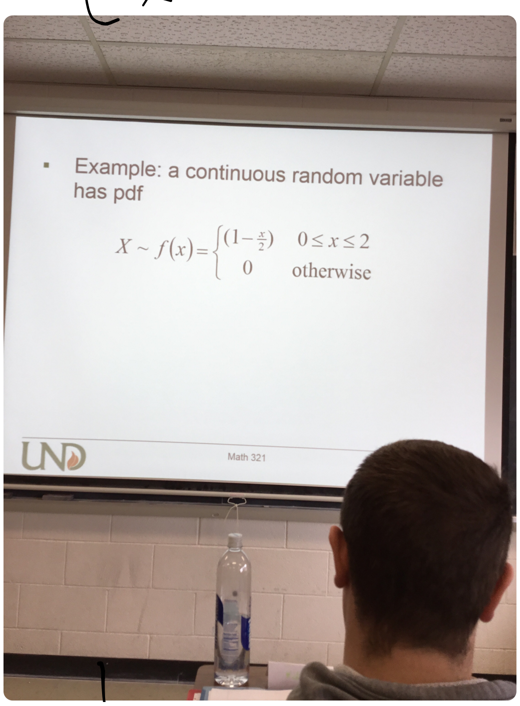
*restrictions on curve?

≥ 0

$P(-\infty \leq x \leq \infty) = 1$

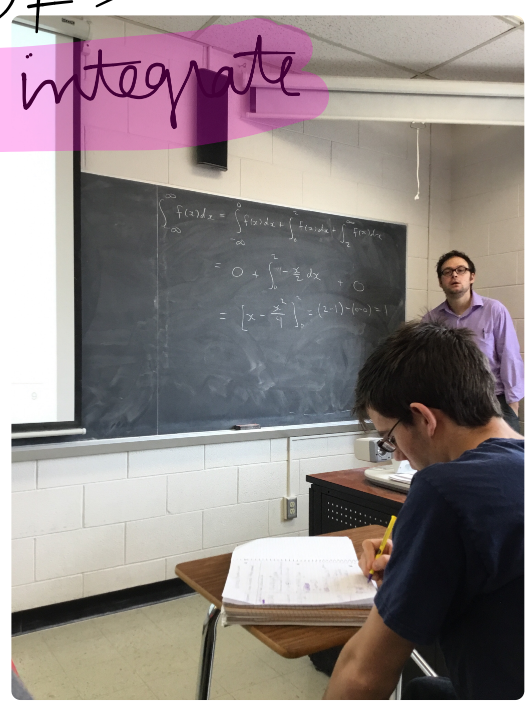
P(getting exactly A)? $= 0$

Ex:



PDF?

1* integrate



$P(0.5 \le X \le 1)$

$$\int 1 - \frac{x}{2}\,dx = \left(x - \left(\frac{x^2}{4}\right)\right)\Bigg|_{\frac{1}{2}}^{1/2}$$

$$\left(1 - \frac{1}{4}\right) - \left(\frac{1}{2} - \frac{1}{16}\right)$$

$$\frac{12}{16} - \frac{7}{16} = \frac{5}{16} = P(0.5 < X < 1)$$

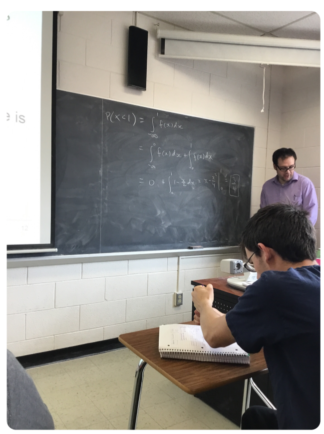
$P(2.5 \le X\ 3.0) = ?$ 0

only betwen $0 + 2$

$P(0.2 \le X \le .2) = ?$ not exactly a value

$= 0$

$P(X < 1) = ?$

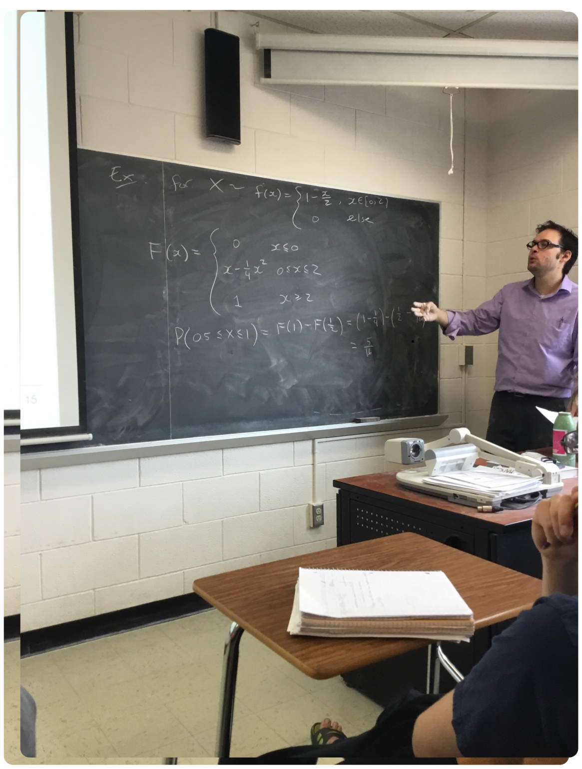


$P(X \le x) = F(x)$

CDF

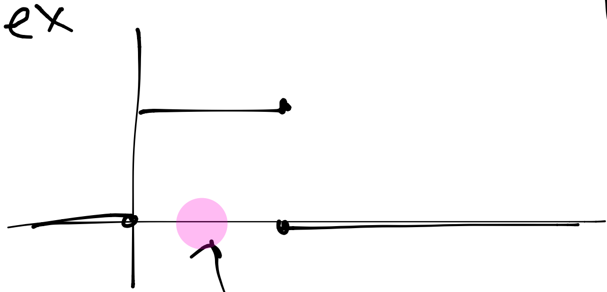
Integral of whole thing $= 1$,
as $F(x) = \int_{-\infty}^{x} f(t)\,dt$

1. as $x \to -\infty$, area $\to 0$
2. as $x \to \infty$. area $\to 1$
3. $P(a \le x \le b) = F(b) - F(a)$
4. F is nondecreasing
   $F(x) \le F(y)$
   + never pick up neg. area



Pop. mean

ex

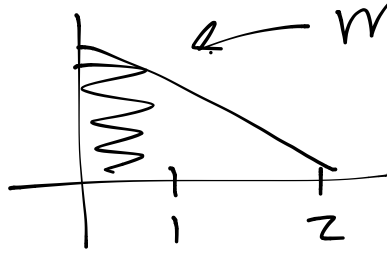


$$\mu = E(x)$$
$$= x \cdot f(x)\, dx$$
$$= \int_0^1 x(1)\, dx$$
$$= \frac{x^2}{2} = \frac{1}{2}$$

ex2:

$X \sim f(x) = (1 - \frac{x}{2})$ $\quad 0 \le x \le 2$

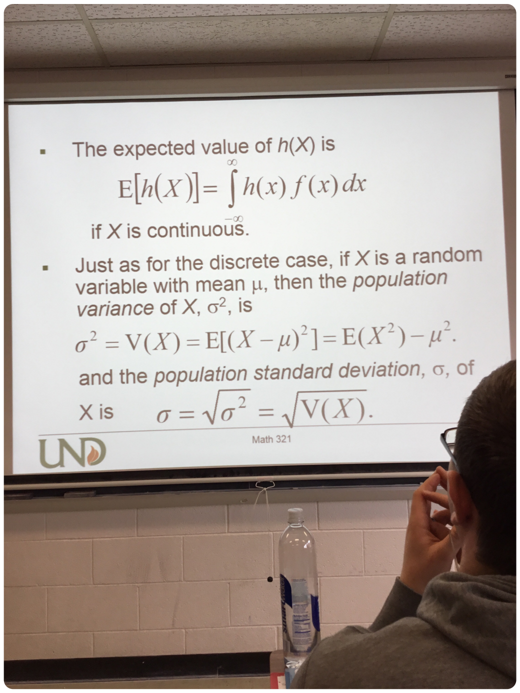
$\mu = ?$



finding BALANCE SPOT

$$\int_0^2 x(1 - \frac{x}{2}) = \Big[_0^2\, x - \frac{x^2}{2}$$
$$\frac{x^2}{2} - \frac{x^3}{6}\Big]_0^2 = 2/3 \ !!$$

Variance



ex:

$$X \sim f(x) \begin{cases} 1, & x \in (0,1) \\ 0 & \text{else} \end{cases}$$

$$\mu = \frac{1}{2}$$

$$V(X) = E(X)^2 - (E(X))^2$$

$$\int_0^1 x^2 \cdot f(x)\,dx - \left(\frac{1}{2}\right)^2$$

$$= \frac{1}{3} - \frac{1}{4} = \frac{1}{12}$$

$$\sigma = \sqrt{\frac{1}{12}} = 0.2887$$

---

for binomials:

use combin(8, E6)

$${}_8C_{E6}$$