lesson #15 week 7 (Normal Distribution) (Exponential Distribution)

1) Exponential Distribution

$f(x) = me^{-mx}$ $m = \frac{1}{\text{mean}}$

1 (AREA UNDER CURVE) Density

a b

- Many electronics follow a failure rate described by an exponential probability density function (PDF). Solar panels are advertised to last 20 years or longer. But panels made in country "C" are failing at a higher rate.

μ = 12 years What's the prob. of failure in the first 5 years?

AREA UNDER the CURVE

0 5 20

e^{-mx}

$0.340759 = e^{-(\frac{1}{12})(0)} - e^{-(\frac{1}{12})(5)}$

Nov 13-2:03 PM

II- Normal Distribution

1) σ = AREA = 1 mean

2) Empirical Rule (No calculator, Approximation)

68% 95% 99.7

Example $\mu = 9.5$kg $\sigma = 1.1$

a) Less than 8.4kg. ≈ 16% one string too left

b) Between 7.3kg and 11.7kg 95%

c) more than 12.8 0.15

III Z-SCORES = $\frac{x-\mu}{\sigma}$

ex) 9.5 → 0

8.4 → $\frac{8.4-9.5}{1.1} = -1$

Nov 13-2:14 PM

IV- Comparing Z-SCORES

ZSCORE $\frac{x-\mu}{\sigma}$

	μ	σ
1) LSAT	151	10
MCAT	25.1	6.4

$Z = \frac{172-151}{10} = 2.1$ ✓

$Z = \frac{37-25.1}{6.4} = 1.86$

Question SCORES LSAT 172

MCAT 37

Nov 13-2:45 PM

Exercise - Heights for Adult (Units are inches)

$\sigma = 2.69$ 69.6 males

$\sigma = 2.52$ 64.3 Females

a) If a man is 6 feet 3 inches tall, what's his z-score? (use two decimals)

6 feet $\times 12 = 72 + 3 = 75$ inches

$Z = \frac{75-69.6}{2.69} = 2.01$

b) If a woman is 5 feet 11 inches tall, what's her z-score? (use 2 decimals)

5 feet $\times 12 = 60$, $60 + 11 = 71$

$Z = \frac{71-64.3}{2.52} = 2.65$

Nov 13-2:52 PM

c) What percentage of women are taller than 5'11"? (nearest tenth)

5'11" = 71 inches

$\sigma = 2.52$ 64.3 71

Z scores $\mu = 0$ $\sigma = 1$ 0 2.66

menu 2 #5 #1 F2 NEG

Data: Variable Lower = 71 Upper = 1000 $\sigma = 2.52$ $\mu = 64.3$

Data: Variable Lower = 2.66 Upper = 10 $\sigma = 1$ $\mu = 0$

$P = 0.4\%$

Nov 13-2:59 PM

d) left → 47% 64.3

$\sigma = 2.52$

AREA = 47%

menu 2 #5 #1 #3 (Inv.)

TAIL = left

AREA = 0.47

$\sigma = 2.52$

$\mu = 64.3$

Nov 13-3:09 PM