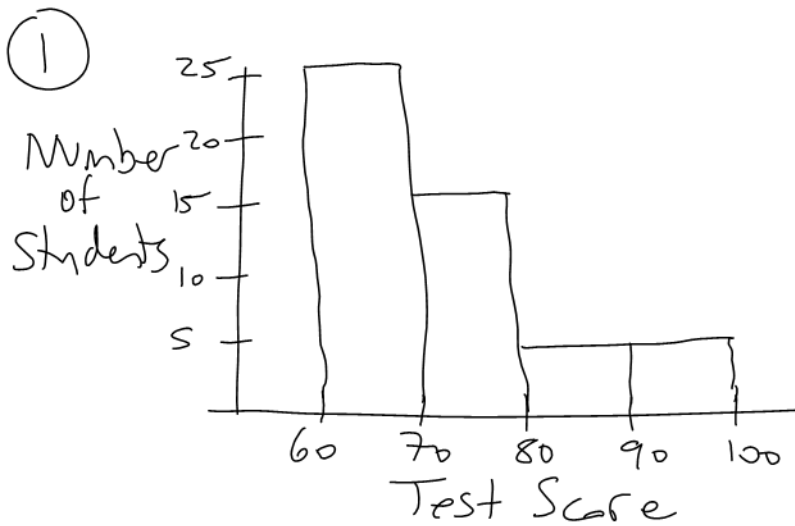


# Test Review



a) Describe the shape.

unimodal skewed right

b) Any outliers?

No

c) Find the mode or the modes.

Value(s) where the peak occurs.

60-70 is the mode.

d) What % of students scored under 70?

$$\begin{aligned} \text{Total \#} &= 25 + 15 + 5 + 5 \\ &= 50 \end{aligned}$$

$$\frac{25}{50} \text{ or } 0.5 \text{ or } 50\%$$

② What is the main problem with the following graph?

### Classroom Usage on School Days



In correct scale on horizontal axis.

③ Consider the population:  
4, 2, 12, 4, 3

a) Calculate the mean

$$\mu = \frac{(4+2+12+4+3)}{5} = 5$$

b) Calculate the median

ordered: 2, 3, 4, 4, 12

median = 4

c) Which is more representative?

median

④ A population has mean  $\mu$  and standard deviation  $\sigma$ .

Find:

a) the new standard deviation if every measurement is multiplied by 9.

$9\sigma$

b) the new standard deviation if every measurement is increased by 9.

$\sigma$

c) the new mean if every measurement is multiplied by 9

$9\mu$

d) the new mean if every measurement is increased by 9

$\mu + 9$

⑤ A population has  $\mu = 20$  and  $\sigma = 4$ . What % of measurements will fall between 13.5 and 26.5?

Tchebysheff (no mention  
of mound-shaped)

$$26.5 = \mu + k\sigma$$

$$26.5 = 20 + k(4)$$

$$6.5 = k(4)$$

$$1.625 = k$$

$$1 - \frac{1}{k^2} = 1 - \frac{1}{(1.625)^2}$$

$$\approx 0.62$$

AT LEAST 62%

- ⑥ A mound-shaped population has  $\mu = 80$  and  $\sigma = 9$ . In what range will approx. 95% of measurements fall?

# Empirical Rule

$$\mu - 2\sigma \leq x \leq \mu + 2\sigma$$

$$80 - 2(9) \leq x \leq 80 + 2(9)$$

$$62 \leq x \leq 98$$

Follow-Up #1

Same but 68%

$$\mu - \sigma \leq x \leq \mu + \sigma$$

$$80 - 9 \leq x \leq 80 + 9$$

$$71 \leq x \leq 89$$

Follow Up #2

Same but 99.7%

$$\mu - 3\sigma \leq x \leq \mu + 3\sigma$$

$$80 - 3(9) \leq x \leq 80 + 3(9)$$

$$53 \leq x \leq 107$$

⑦ A student writes 2 tests and their time is measured (in minutes).

|        | Time | $\mu$ | $\sigma$ |
|--------|------|-------|----------|
| Test A | 42   | 49    | 3.5      |
| Test B | 38   | 40    | 2        |

Which test did the student write the fastest relative to the class?

$$\text{Test A: } z = \frac{x - \mu}{\sigma} = \frac{(42 - 49)}{3.5} = -2$$

$$\text{Test B: } z = \frac{x - \mu}{\sigma} = \frac{(38 - 40)}{2} = -1$$

Fastest  $\Rightarrow$  time is smallest relative to class

$\Rightarrow$  z-score is smallest

$\Rightarrow$  Test A

⑧ A 5-digit password  
can only use symbols 1, 2, 3, 4, 5, 6.

a) How many passwords  
start with 22 or end with  
36?

Inclusion - Exclusion

$$n(A \text{ or } B) = n(A) + n(B) - n(A \text{ and } B)$$

6 symbols

$$n(\text{start } 22) = 1 \times 1 \times 6 \times 6 \times 6 \\ = 216$$

$$n(\text{end } 36) = 6 \times 6 \times 6 \times 1 \times 1 \\ = 216$$

$$n(\text{start } 22 \text{ and end } 36) = 1 \times 1 \times (6 \times 1) \times 1 \\ = 6$$



$$n(\text{start } 22 \text{ or end } 36) = 216 + 216 - 6 \\ = 426$$

b) How many passwords  
have no 6's?

Symbols: 1, 2, 3, 4, 5

$$5 \times 5 \times 5 \times 5 \times 5 = 5^5 = 3125$$

c) How many passwords  
have at least one 6?

total # of passwords

— # of passwords with no 6's

$$= 6^5 - 5^5$$

$$= 4651$$

⑨ Two fair 6-sided dice  
are rolled. Find the  
probability that at least

one roll is a 6.

(red) (blue)

Die 1 \ Die 2 1 2 3 4 5 6

1  
2  
3  
4  
5  
6

|  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
|  |   |   |   |   |   |   | X |
|  |   |   |   |   |   |   | X |
|  |   |   |   |   |   |   | X |
|  |   |   |   |   |   |   | X |
|  |   |   |   |   |   |   | X |
|  |   |   |   |   |   |   | X |
|  | X | X | X | X | X | X | X |

total # of outcomes =  $6 \times 6$   
 $= 36$

# of desirable outcomes = 11

$$\frac{11}{36}$$

10 Find  $k$  so that the following is a valid probability distribution.

| $X$ | $P(X)$ |
|-----|--------|
| -2  | $k$    |
| 1   | 0.35   |
| 7   | 0.45   |

sum to 1

$$k + 0.35 + 0.45 = 1$$

$$k + 0.8 = 1$$

$$k = 0.2$$