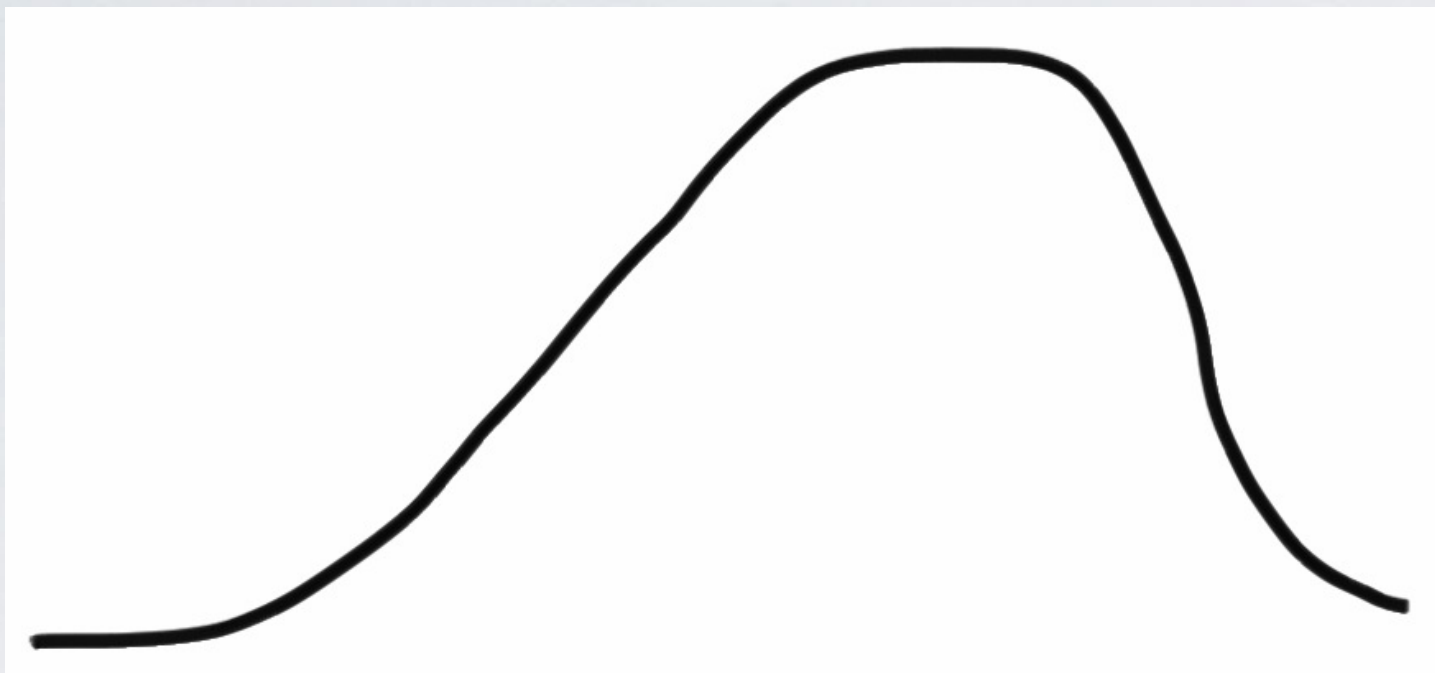


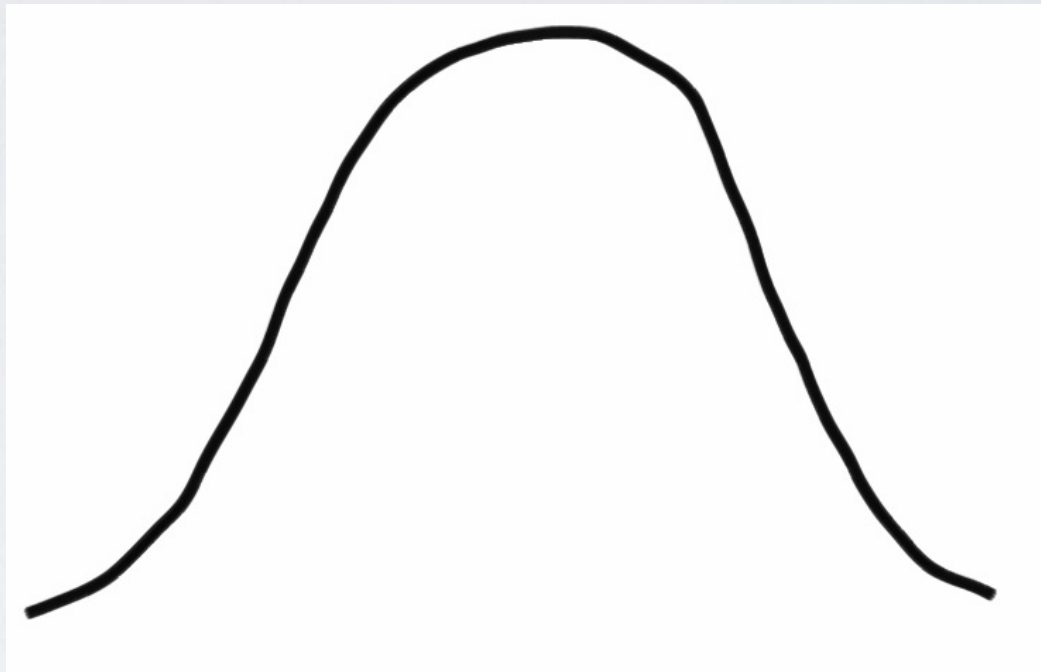
# measures of center

shape

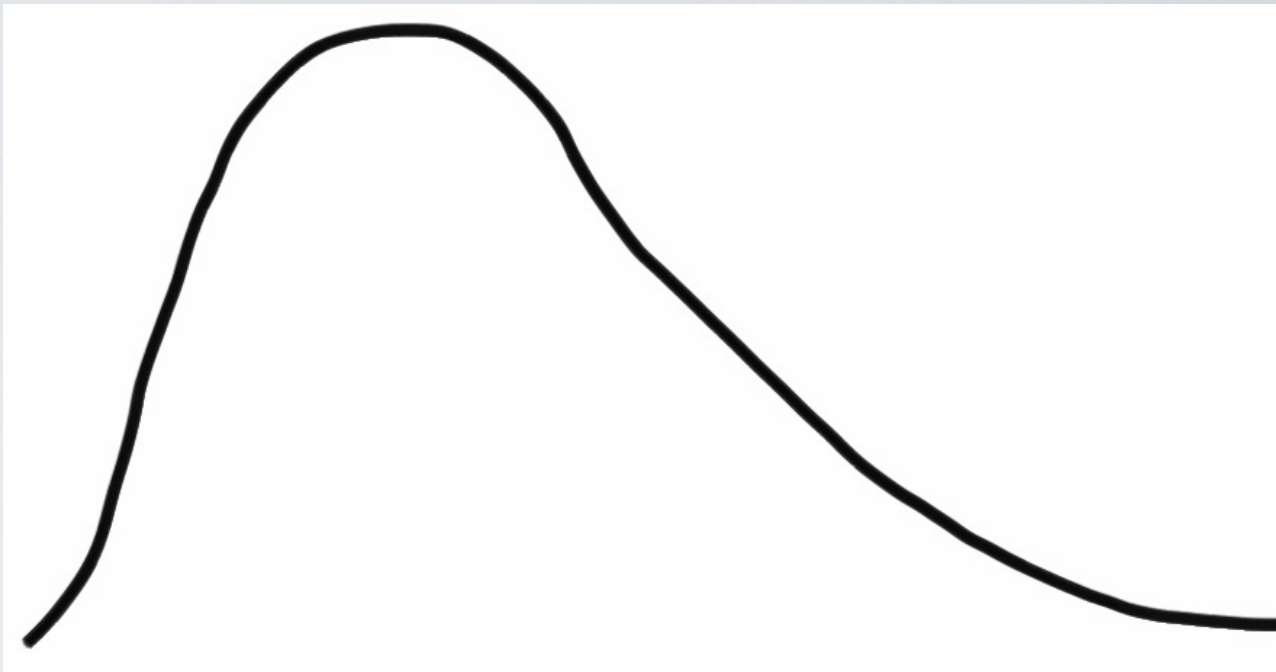
skewness



left skewed

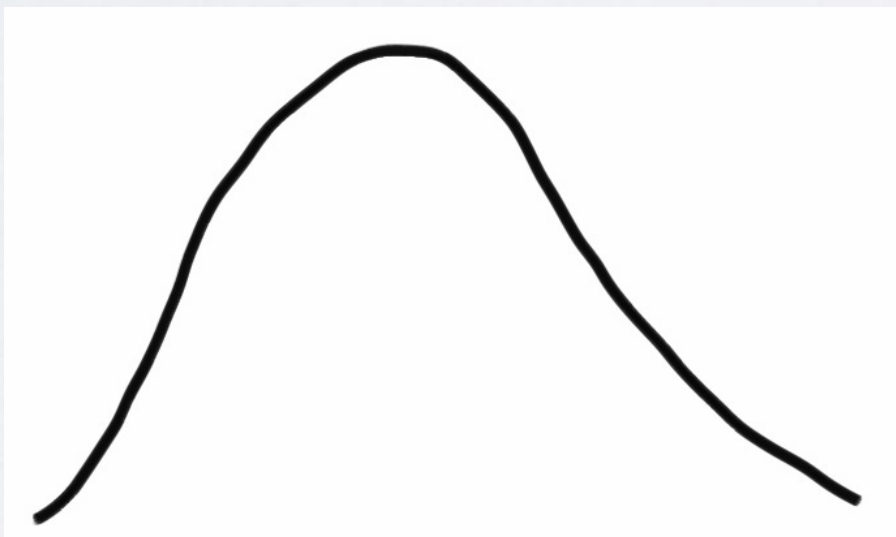


symmetric

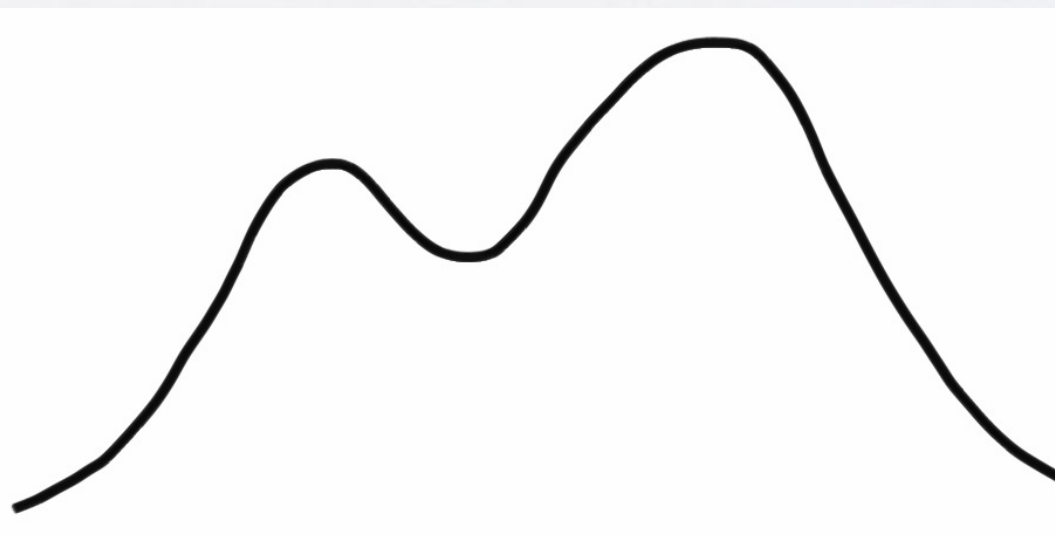


right skewed

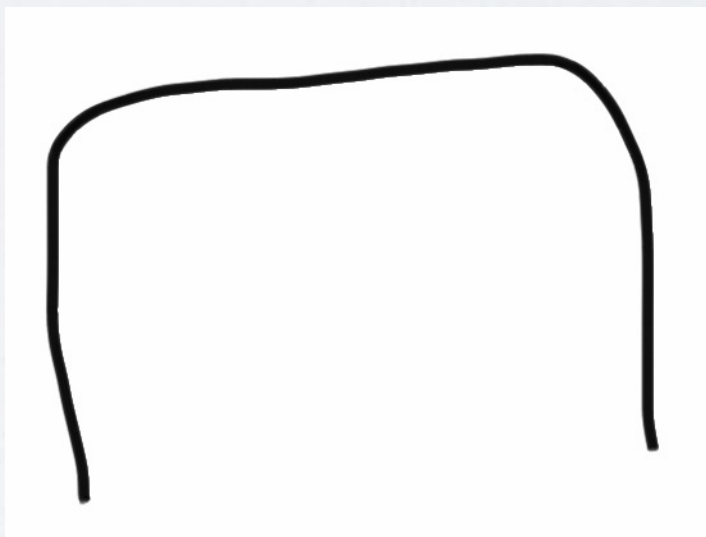
modality



unimodal



bimodal



uniform



multimodal



## mean

arithmetic average

$\bar{x}$  sample mean

$\mu$  population mean

## median

midpoint of the  
distribution  
(50th percentile)

measures of center

## mode

most frequent  
observation

sample statistic

point estimate

population parameter

example

9 students' exam scores:

75, 69, 88, 93, 95, 54, 87, 88, 27

mean: 
$$\frac{75 + 69 + 88 + 93 + 95 + 54 + 87 + 88 + 27}{9} = 75.11$$

mode: 88


median: 27, 54, 69, 75, 87, 88, 88, 93, 95



*example*

10 students' exam scores:

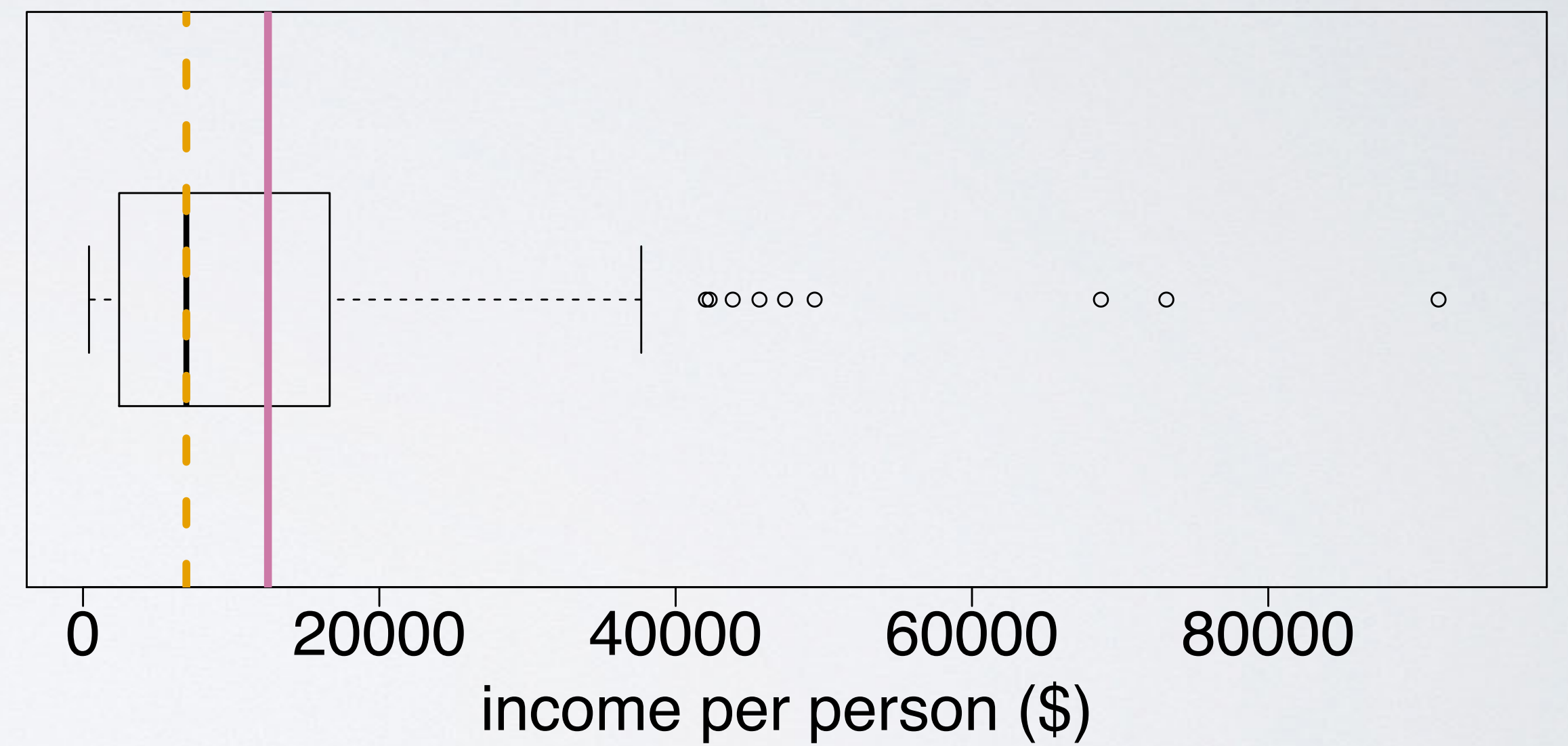
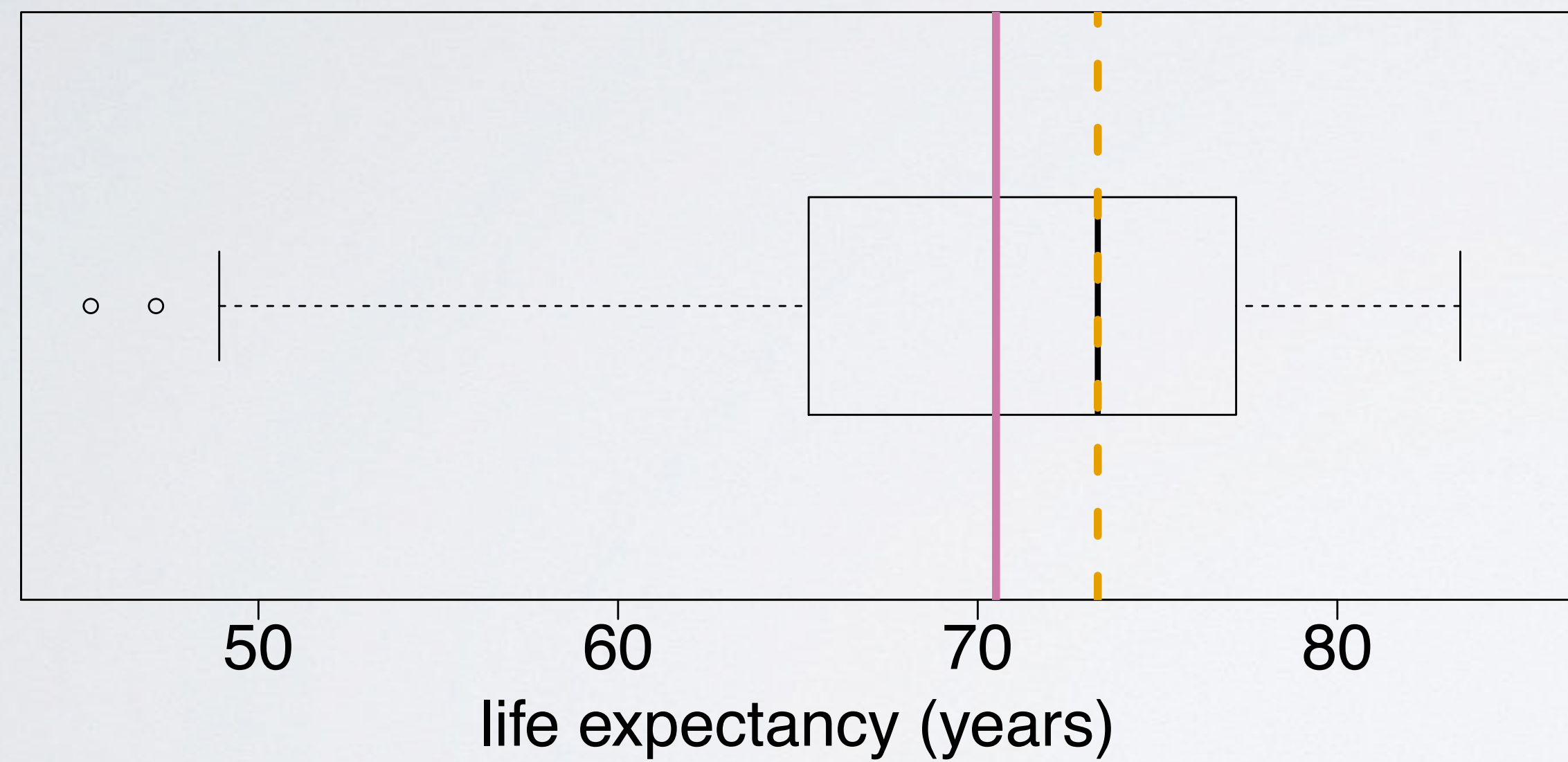
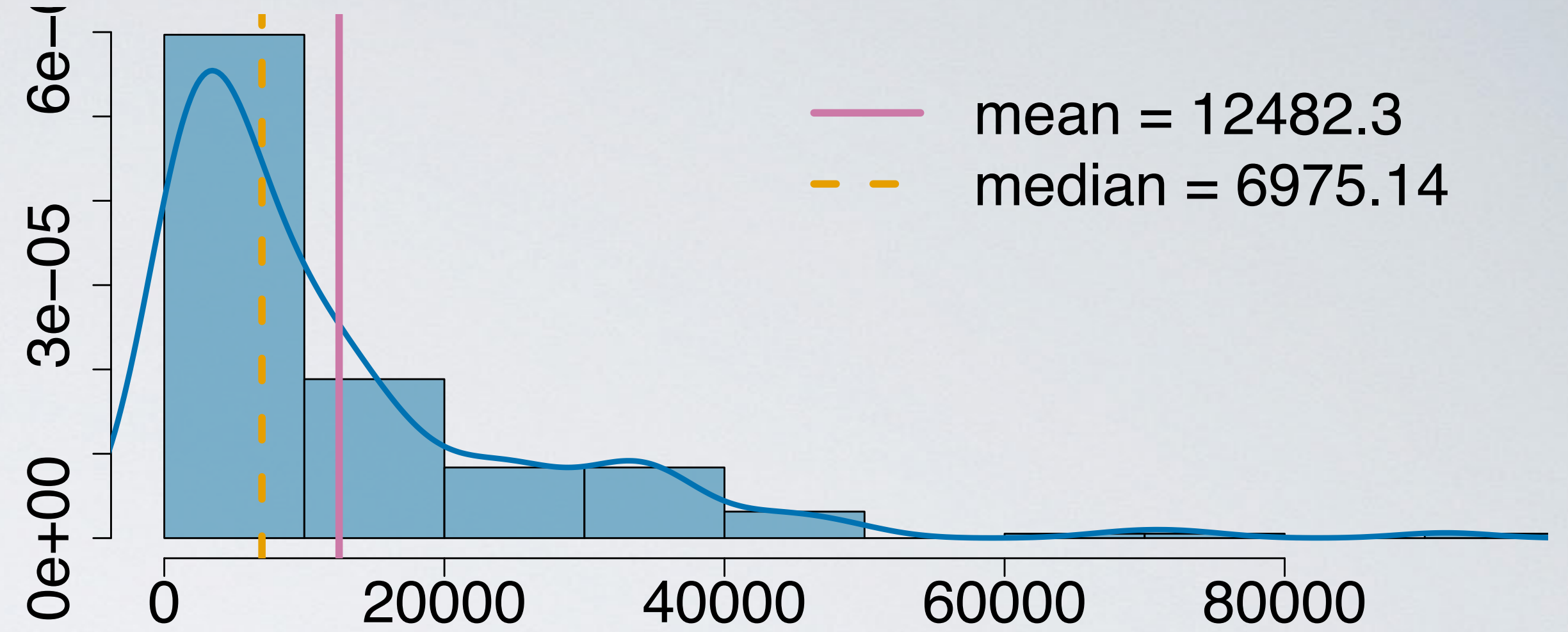
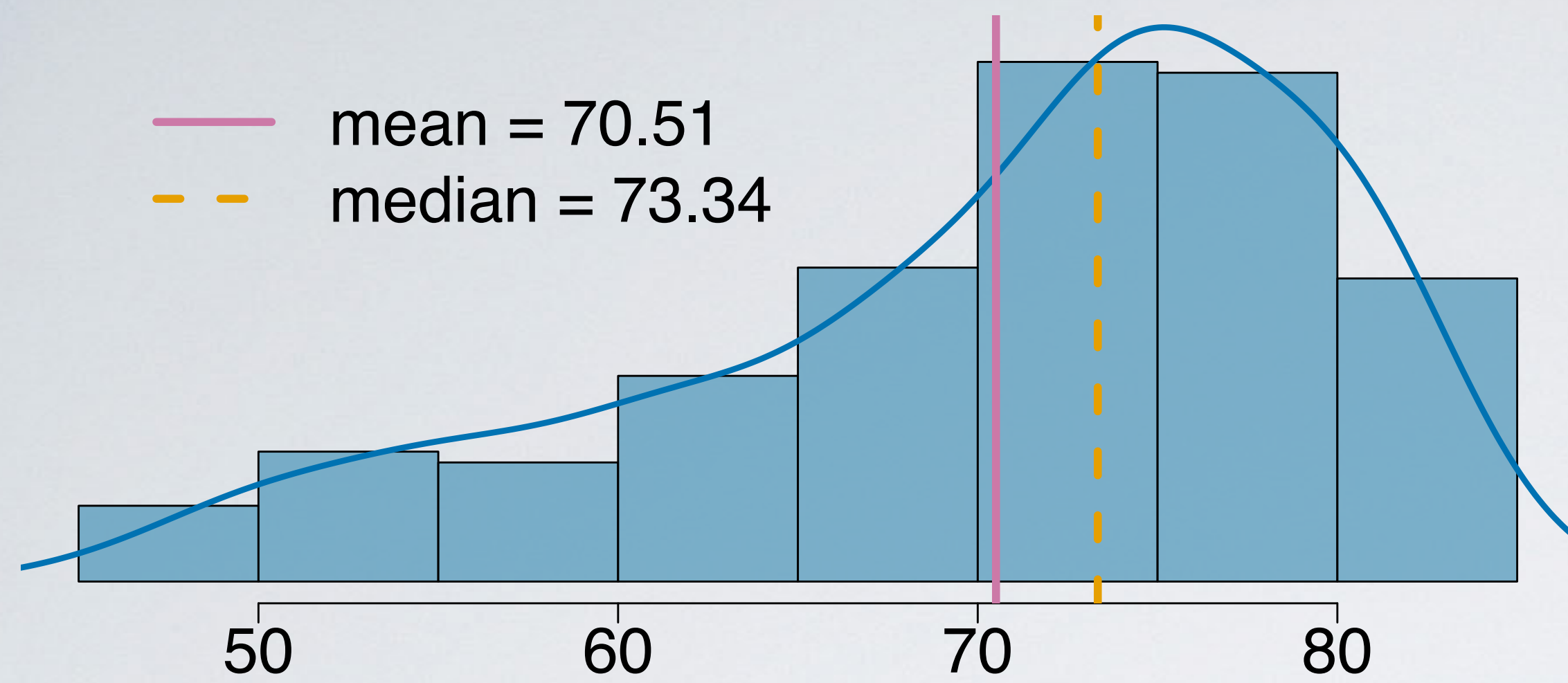
27, 54, 69, 75, 87, 88, 88, 93, 95, 100


$$\frac{87 + 88}{2} = 87.5$$

data	income per person (\$, 2012)	life expectancy (years, 2012)
Afghanistan	1359.7	60.254
Albania	6969.3	77.185
Algeria	6419.1	70.874
...	...	...
Zimbabwe	545.3	58.142

Source: [gapminder.com](http://gapminder.com)





# skewness vs. measures of center

