Quantitative Skills & Reasoning - Math 1001

Dr. Bob Brown, Jr.
Dean Emeritus
Professor Emeritus
East Georgia State College

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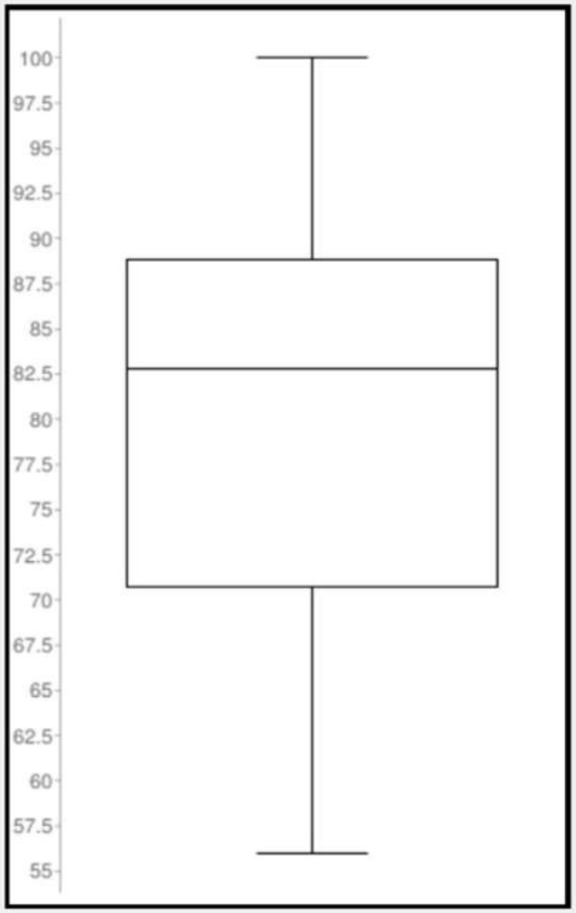
1. Test 2 Results
2. Concepts Some Missed
3. Questions
4. Overview of Functions On Next Unit
5. A Great On-Line Graphing Application

Population size: 29
Median: 82.8
Minimum: 56
Maximum: 100
First quartile: 70.7
Third quartile: 88.85
Interquartile Range: 18.15

Mean 80.6

Test 2 Grades



Q_4 100

Q_3 88.85

Median - Q_2 82.8

Q_1 70.7

Min 56

Concept Not Understood by Some – Quartile Understanding

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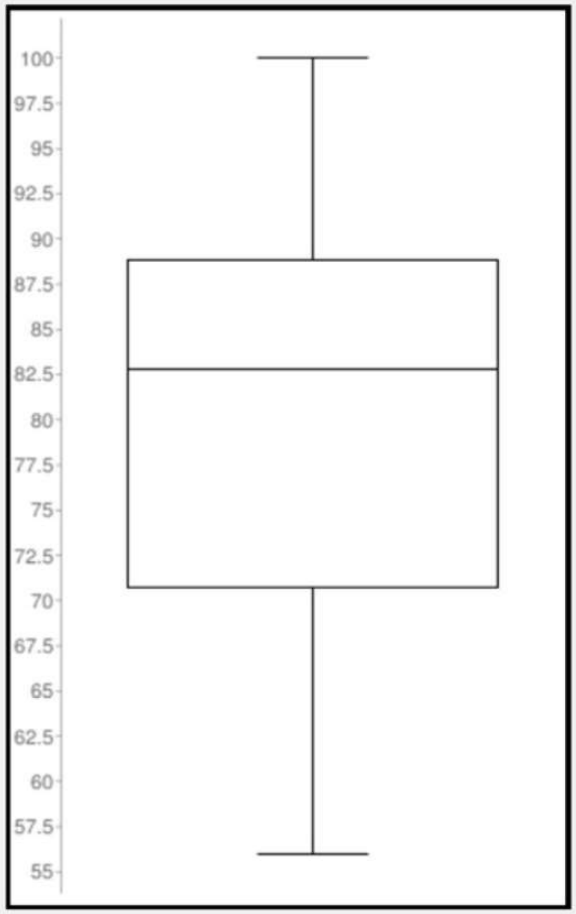
Test 2 Grades



Q_4 100

Q_3 88.85

Median - Q_2 82.8

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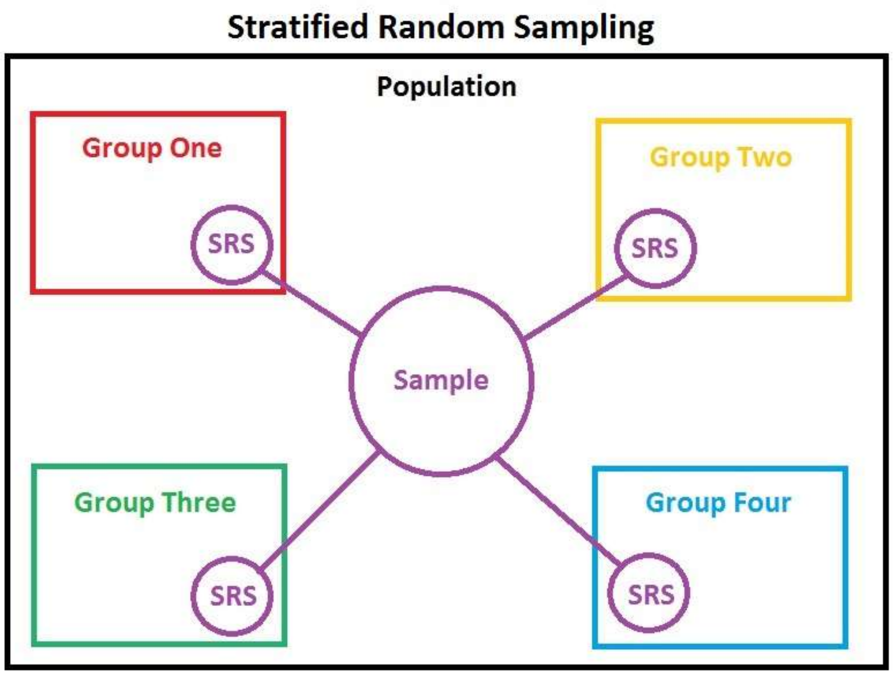
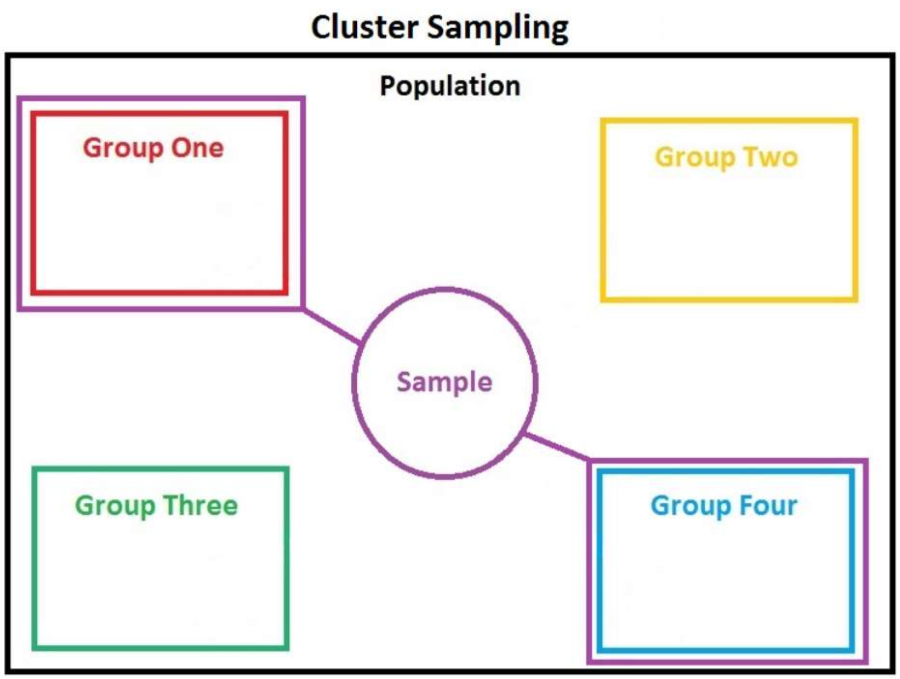
Min 56

Concept Not Understood by Some – Sampling Methods





Concept Not Understood by Some – Data Types

Phone Number is not Numerical, It is Categorical

Birth Year is Numerical – The Number Leads To Numerical Info

Concept Not Understood by Some – Not Double Checking Data!

Do it Twice

The slope of the graph of the equation y = mx + b is *m*, and the *y*-intercept of the graph is *b*.

If a nonvertical line passes through the points $P(x_1, y_1)$ and $Q(x_2, y_2)$,
Its slope is found using the formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

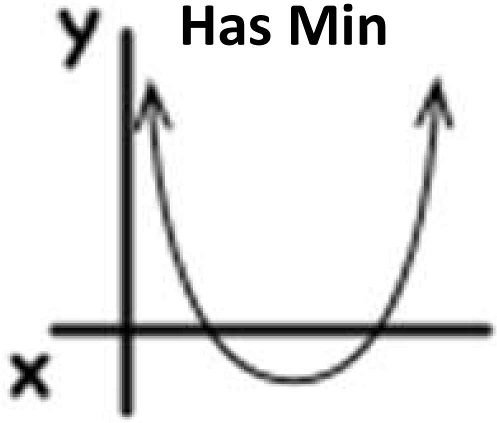
The equation of the line with slope *m* and passing through a known point (x_1, y_1) is

$$y - y_1 = m(x - x_1)$$

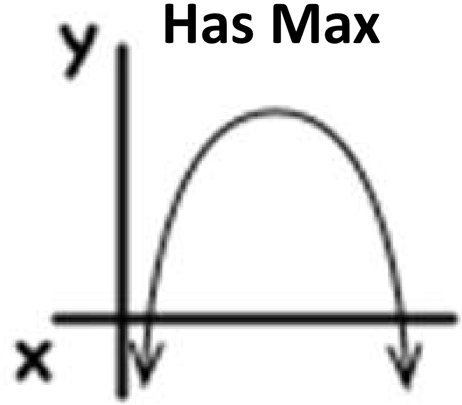
Quadratic Functions

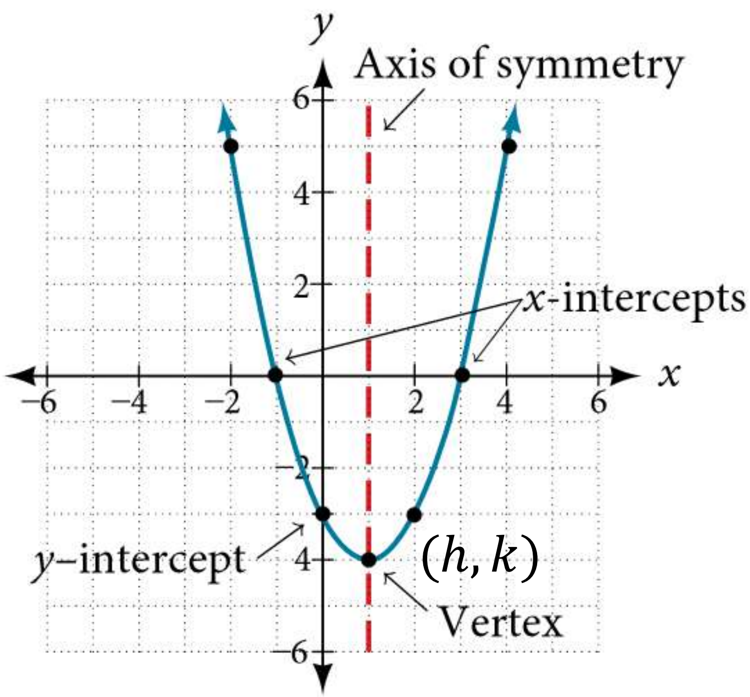
<u>Definition</u>: A quadratic function has the form y = f(x)=ax^2+bx+c, where a, b, and c are real numbers and $a \neq 0$. The domain of quadratic functions is the set of all real numbers. The graph of a quadratic function is called a parabola.

a > 0
Opens Up
Has Min



a < 0
Opens Down
Has Max





The axis of symmetry is defined by

$$x = -\frac{b}{2a}$$

The x intercepts (where y = 0) can be calculated by
The famous Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

An alternate form of the quadratic function is y $= f(x) = a(x-h)^2 + k$

$$where\ h = -\frac{b}{2a}\ and\ \ k\ is\ the \min or \max value\ of\ the\ function.$$

$$k = f(h) = f(-\frac{b}{2a})$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$Note\ the\ discriminant\ is\quad b^2 - 4ac$$

$If\ \ b^2 - 4ac > 0$, there are two real roots (zeros)

$If\ \ b^2 - 4ac < 0$, there are two complex conjugate roots (zeros)

$If\ \ b^2 - 4ac = 0$, there are two equal real roots (zeros)

Exponential Growth

If a quantity starts at size P_0 and grows by R% (written as a decimal, r) every time period, then the quantity after n time periods can be determined using either of these relations:

Recursive form: $P_n = (1 + r)\, P_{n-1}$

Explicit form: $P_n = P_0(1 + r)^n$

We call *r* the **growth rate**.

The term (1 + *r*) is called the **growth multiplier**, or common ratio.

Where Have We Seen This Before?

$$FV = PV\left(1+\frac{\mathrm{r}}{n}\right)^{(nt)}$$

Exponent

Compound interest is interest paid on both the original principal and on all interest that has been added to the original principal.

FV = accumulated balance after t years (Future Value)

PV = starting principal (Present Value)

r = annual percentage rate (as a decimal)

t = number of years

n = number of compounding periods (e.g. annually, semi-annually, quarterly, monthly, daily)

Recursive form: $P_{\underline{n}} = (1 + r)\, P_{n-1}$

Explicit form: $P_n = \mathrm{P}_0(1 + r)^n$

We call *r* the **growth rate**.

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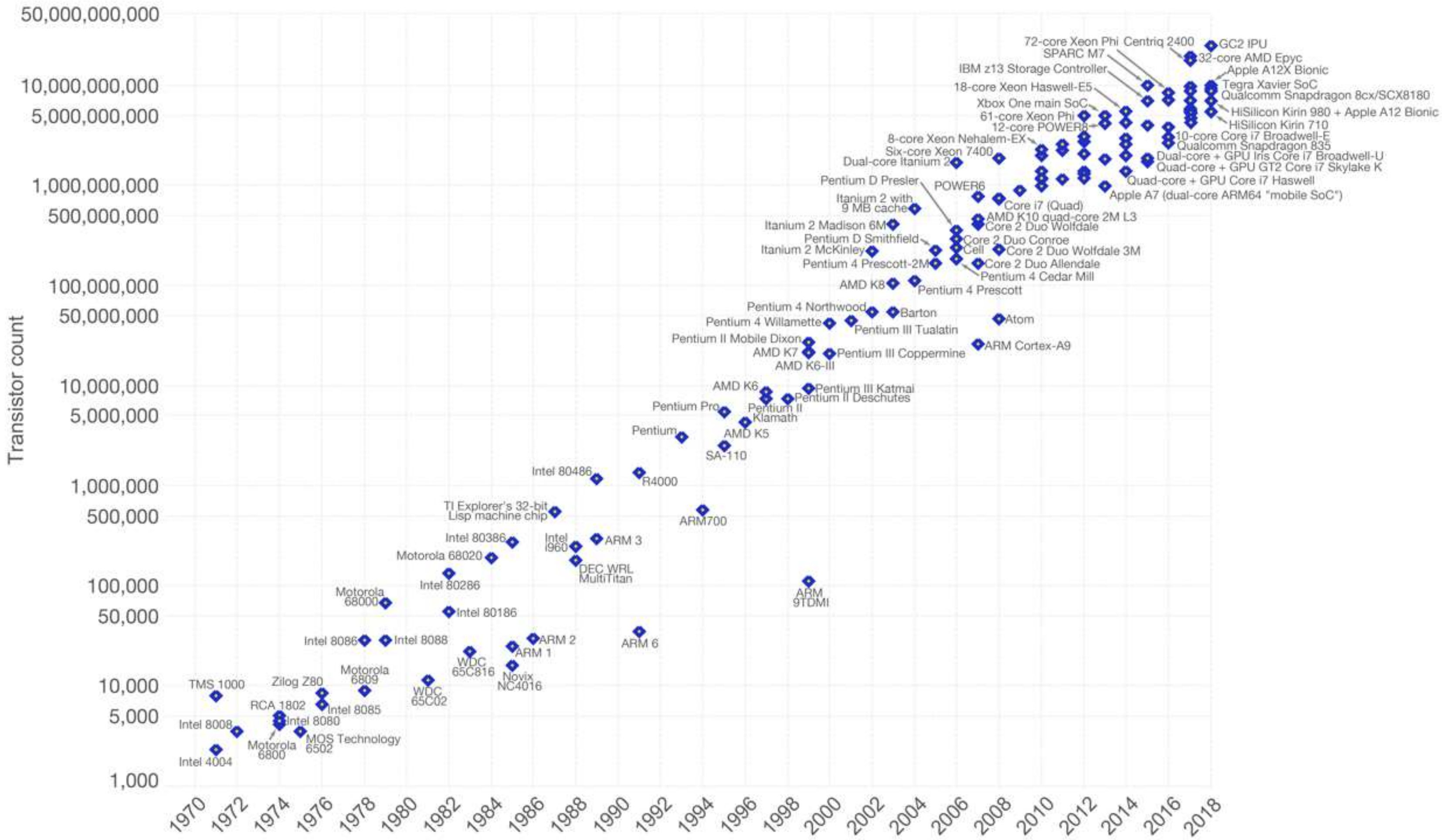
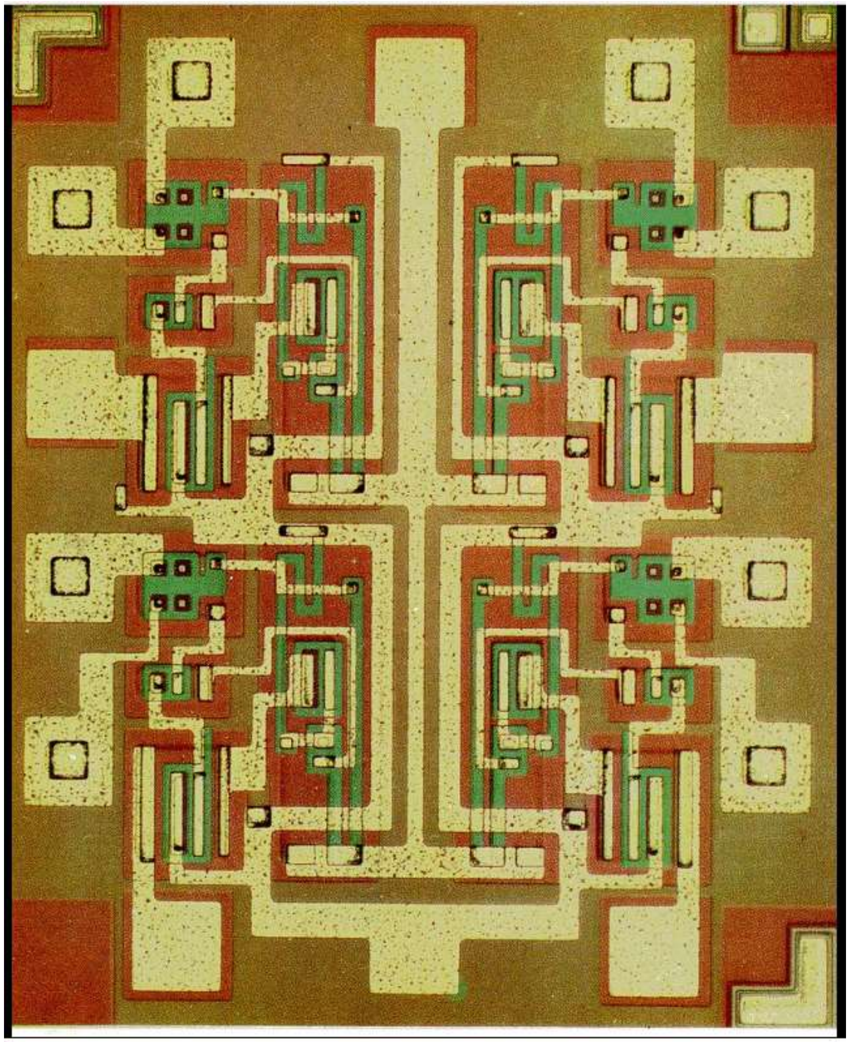
Moore's Law – The number of transistors on integrated circuit chips (1971-2018)

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important as other aspects of technological progress – such as processing speed or the price of electronic products – are linked to Moore's law.





MOSFET scaling
(process nodes)

10 µm – 1971
6 µm – 1974
3 µm – 1977
1.5 µm – 1981
1 µm – 1984
800 nm – 1987
600 nm – 1990
350 nm – 1993
250 nm – 1996
180 nm – 1999
130 nm – 2001
90 nm – 2003
65 nm – 2005
45 nm – 2007
32 nm – 2009
22 nm – 2012
14 nm – 2014
10 nm – 2016
7 nm – 2018
5 nm – 2019
3 nm – *~2021*

A Great On-Line Graphing Website

https://www.desmos.com/calculator