Pre-Calc AB

Lesson 61

11/20/15

Agenda: 11/20/15

Lesson 61

Single-Variable Analysis

Normal Distribution

Box and Whisker Plots

Single list of Data : $x_1, x_2, x_3, \ldots, x_n$

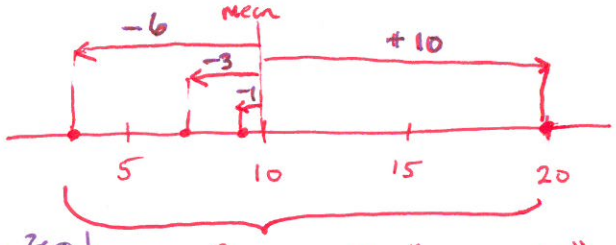
Mean (Average) $= \dfrac{x_1 + x_2 + \cdots + x_n}{n} = \dfrac{1}{n}\sum_{i=1}^{n} x_i = \mu$

Standard deviation

"how spread out the data is"

Ex: 4, 7, 9, 20

$\text{mean} = \dfrac{4+7+9+20}{4} = \dfrac{40}{4} = \boxed{10}$



Deviation of the measurement x_i:

$(x_i - \mu)$

★ Average of the Deviations is always Zero!

Range = 16 "max - min"

$\text{Variance} = \dfrac{(x_1-\mu)^2 + \cdots + (x_n-\mu)^2}{n} = \dfrac{1}{n}\sum_{i=1}^{n}(x_i-\mu)^2$

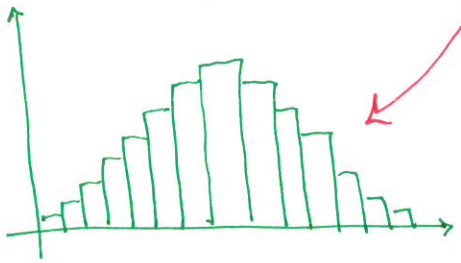
$\text{Variance} = \dfrac{(-6)^2+(-3)^2+(-1)^2+(10)^2}{4} = 36.5$

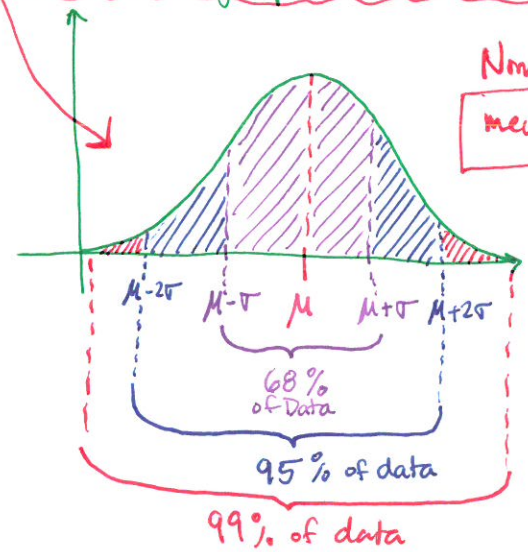
σ = Standard deviation $= \sqrt{\dfrac{1}{n}\sum_{i=1}^{n}(x_i-\mu)^2}$

$\sigma = \sqrt{36.5} \approx 6.04$

Normal (Gaussian) Distribution – theoretical frequency distribution approx. by data collected experimentally

Bell shaped curve for frequency Distribution graph (histogram)





Normal Distribution

mean = mode = median

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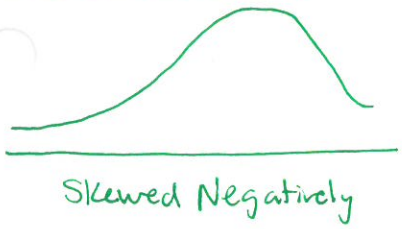
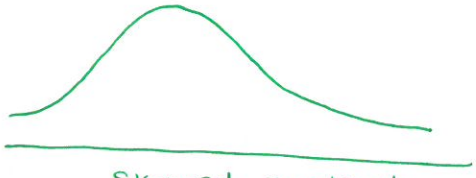
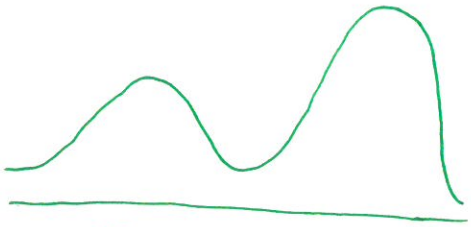
Other Distributions:



Skewed Negatively



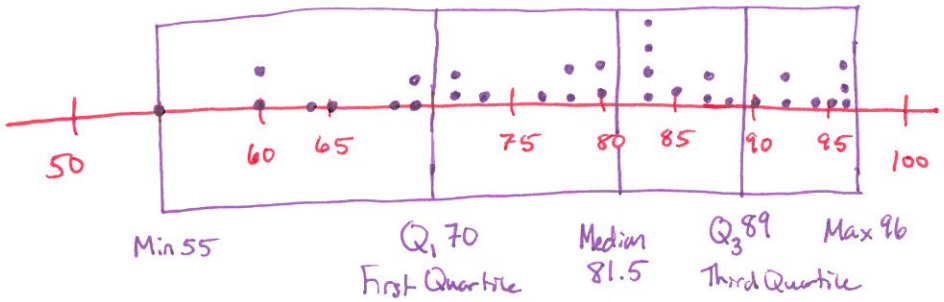
Skewed positively



Bimodal Distribution

Median = middle of data

Mode = data measurement appearing the most



Box and Whisker Plot

Use a Calculator:

STAT → 1: EDIT → L1 enter data 60, 72, 74, 85, 90, 92, 81

STAT → CALC → 1: 1-VAR STATS

$\bar{x} \approx 79.14$ (Mean)

$\sigma x \approx 10.45$ (Standard Deviation)

$n = 7$ (number of measurements)

$\min X = 60$

$Q_1 = 72$

$\text{Med} = 81$

$Q_3 = 90$

$\text{Max } X = 92$

Pre-Calc AB | Lesson 62+63 | 11/23/15

Agenda: 11/23/15

Lesson 62+63

Abstract Coefficients
Linear Variation
Circles

* Handout WS 22
* QT Slips Due Today! [P8, P3, P2, P4]

Abstract Coefficients - systems of equations with abstract coefficients

Ex. 62.2 Solve for x:

$$\begin{cases} a_1 x + b_1 y = c_1 & (1) \\ a_2 x + b_2 y = c_2 & (2) \end{cases}$$

$(1) * b_2$ $\quad a_1 b_2 x + b_1 b_2 y = c_1 b_2$

$(2) * (-b_1)$ $\quad -a_2 b_1 x - b_1 b_2 y = -c_2 b_1$

$$x(a_1 b_2 - a_2 b_1) = c_1 b_2 - c_2 b_1$$

$$x = \frac{c_1 b_2 - c_2 b_1}{a_1 b_2 - a_2 b_1}$$

Ex. The cleanup cost at a Motel varies linearly with the number of rooms rented out. When 20 rooms are rented, the cleanup cost is $250 per day; likewise, when 30 rooms are rented, it costs $325 per day. How much is the cleanup cost per day when all 50 rooms are rented out?

$C = mR + b$ $\quad$ C = cost $\quad$ R = # of rooms

$m = \frac{325 - 250}{30 - 20} = \frac{75}{10} = 7.5$ $\quad 250 = \frac{75}{10} \cdot 20 + b \quad b = 100$

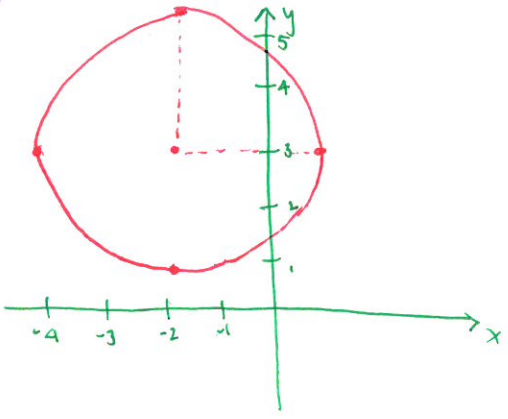
$C = 7.5R + 100$ $\quad C = \frac{75}{10} \cdot 50 + 100 = 475$

The cleanup cost per day is $475 when all 50 rooms are rented out.

Ex 63.2 Given the general form of the equation of a circle $x^2 + y^2 + 4x - 6y + 6 = 0$, Complete the square to write the standard form and graph it.

$(x^2 + 4x + \underline{4}) + (y^2 - 6y + \underline{9}) = -6 + \underline{4} + \underline{9}$

$(x+2)^2 + (y-3)^2 = (\sqrt{7})^2$



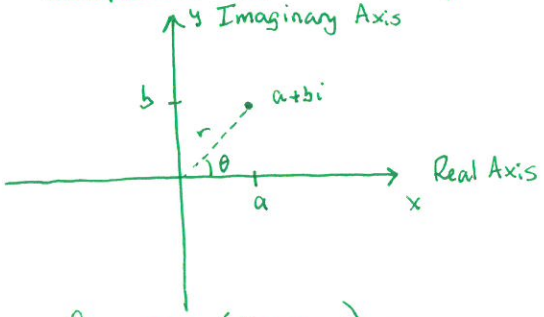
PreCalc AB

Lesson 64

12/1/15

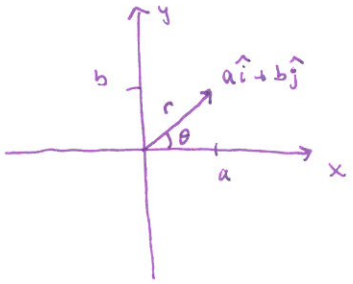
Agenda: 12/1/15
Lesson 64
Complex Plane
Polar form of a Complex Number
Sum/products of complex numbers
★ Quiz 8 tomorrow lessons 55-60

Complex Plane: $a+bi$, a is the real part, b is the imaginary part (rectangular form)



Complex (Argand) plane

Vectors: $a\hat{i} + b\hat{j}$ or $r\angle\theta$ (polar form)



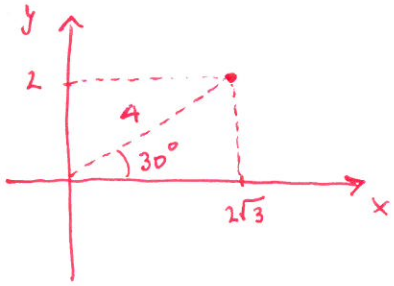
Rectangular (Cartesian) Coordinate System

★ **Warning:** Don't Confuse i with $\hat{i}$

Polar form of $a+bi$: $r(\cos\theta + i\sin\theta) = \boxed{r\,\text{cis}\,\theta}$ OR $= re^{i\theta}$

Absolute value: $|a+bi| = r$

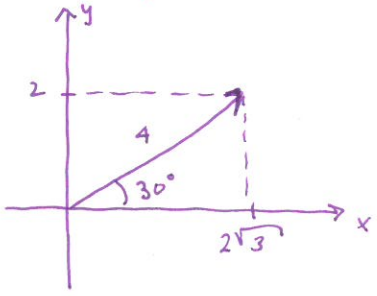
Ex. $2\sqrt{3}+2i$ vs. $2\sqrt{3}\hat{i}+2\hat{j}$



Polar form: $4\,\text{cis}\,30°$

$= 4(\cos 30° + i\sin 30°)$

$|2\sqrt{3}+2i| = 4$



Polar form: $4\angle 30°$

★ Can't add in polar form unless angles differ by 180°.

★ Add in Rectangular form just like vectors.

Multiplication of Complex Numbers:

$$(a+bi)(c+di) = (ac-bd)+(ad+bc)i$$

or $r_1 e^{i\theta_1} \cdot r_2 e^{i\theta_2} = r_1 \cdot r_2 \cdot e^{i(\theta_1+\theta_2)} = r_1 r_2\,\text{cis}\,(\theta_1+\theta_2)$

Ex. 64.1 Multiply: $[5(\cos 20° + i\sin 20°)][6(\cos 42° + i\sin 42°)]$

$= (5\,\text{cis}\,20°)(6\,\text{cis}\,42°)$

$= 30\,\text{cis}\,(62°)$

$= \boxed{30(\cos 62° + i\sin 62°)}$

Pre-Calc AB

Lesson 65

12/8/15

Agenda: 12/3/15
lesson 65
Radicals in Trig Equations
Graphs of Log functions
★ Quiz back after lesson

Recall Solving Radical Equations:

Isolate the radical, Square both sides, Solve, Don't forget to check!

Ex. 65.1 Solve $\sin x - \sqrt{1-\sin^2 x} = 0$ given $0 \le x < 2\pi$

1. Isolate $\sqrt{1-\sin^2 x} = \sin x$
2. Square $1-\sin^2 x = \sin^2 x$
3. Solve $\sin^2 x = \frac{1}{2}$ $\sin x = \pm\frac{\sqrt{2}}{2}$ $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$
4. Check $\sqrt{\ } \ge 0 \Rightarrow x \neq \frac{5\pi}{4}, \frac{7\pi}{4}$ $\boxed{x = \frac{\pi}{4}, \frac{3\pi}{4}}$

Ex. Solve $(\cot x - \sqrt{3})(\cos x + 1) = 0$ given $0 \le x < 2\pi$

$\cot x = \sqrt{3}$ or $\cos x = -1$

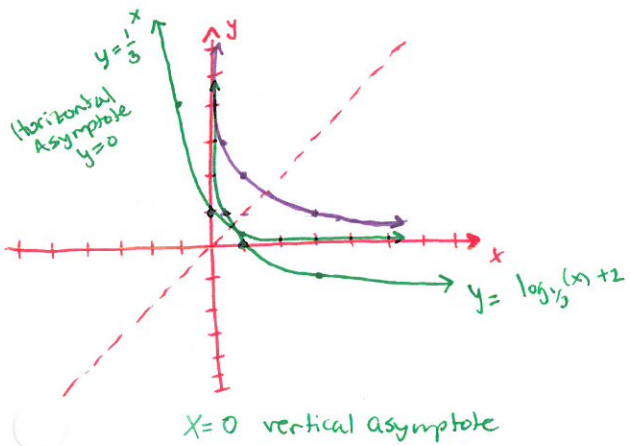
$x = \frac{\pi}{6}$ or $\frac{7\pi}{6}$ $\quad x = \pi$ X

★ Tan, Cot, Csc, Sec all have values where they are undefined. Can't have solutions which make are undefined!

$\cot(\pi) = \frac{\cos(\pi)}{\sin(\pi)}$ is undefined since $\sin\pi = 0$

Graphs of Logarithms:

Ex. Sketch $y = \log_{\frac{1}{3}}(x) + 2$ and find the vertical asymptote.



X=0 vertical asymptote

Ex. Sketch $y = \ln(x-2)$ and find the vertical Asymptote.