Semester Review Day 3

17 Simplify.

Pull out common factors

$$\frac{4(2x-5)^3(3x^2+1)^{-2/3} - 6(2x-5)^2(3x^2+1)^{1/3\,+2/3}}{(3x^2+1)^{1/3}}$$

$$\frac{2\cdot(2x-5)^2\cdot\cancel{(3x^2+1)^{-2/3}}\left[2(2x-5)-3(3x^2+1)^1\right]}{(3x^2+1)^{1/3+2/3}}$$

$$\frac{2(2x-5)^2\left[4x-10-9x^2-3\right]}{3x^2+1}$$

$$\frac{2(2x-5)^2\left[-9x^2+4x-13\right]}{3x^2+1}$$

$\log_e e^7 = 7$

$\log_3 9 = \log_3 3^2 = 2$

$\log_8 \sqrt[3]{64} = \log_8 \sqrt[3]{8^2} = \log_8 8^{2/3} = 2/3$

$\log_9 \frac{1}{81} = \log_9 \frac{1}{9^2} = \log_9 9^{-2} = -2$

Properties of Logs

$\log_b m + \log_b n = \log_b (mn)$

$\log_b m - \log_b n = \log_b \left(\frac{m}{n}\right)$

$\log_b m^p = p \log_b m$

$e^{\ln(3x+7)} = e^4$

$3x+7 = e^4$

$\frac{3x}{3} = \frac{e^4 - 7}{3}$

$x = 15.87$

like f)

$\ln(x+3) + \ln(2x) = 5$

$e^{\ln(2x^2+6x)} = e^5$

$2x^2+6x = e^5$

$2x^2+6x-e^5 = 0$

$x = \frac{-6 \pm \sqrt{36-4(2)(-e^5)}}{2(2)}$

$= \frac{-6 \pm \sqrt{36+8e^5}}{4}$

$x \approx 7.24$

~~≈ -10.24~~

$\log_{\frac{1}{3}} \sqrt[5]{27} = x$

Exponentiate!

$\frac{1}{3}^{\log_{1/3}\sqrt[5]{27}} = \frac{1}{3}^x$

Common bases!

$\sqrt[5]{27} = \frac{1}{3}^x$

$\sqrt[5]{3^3} = 3^{-1x}$

$3^{3/5} = 3^{-x}$

$\frac{3}{5} = -x$

$-3/5 = x$

Like h

$e^{2x} - 3e^x - 10 = 0$

$(e^x - 5)(e^x + 2) = 0$

$e^x - 5 = 0 \quad e^x + 2 = 0$

$\ln e^x = \ln 5 \quad \ln e^x = \ln -2$

$x = \ln 5 \quad x = \cancel{\ln(-2)}$

APPLICATIONS OF LOGS

A farmer purchases a new combine for \$500,000. Its value decreases at 15% per year. When will its value have dropped to \$200,000?

$$N = N_0(1 \pm r)^t$$

$$\frac{200{,}000}{500{,}000} = \frac{500{,}000(1 - 0.15)^t}{500{,}000}$$

$$0.4 = 0.85^t$$

$$\ln(0.4) = \ln(0.85)^t$$

$$\frac{\ln(0.4)}{\ln(0.85)} = \frac{t \cdot \cancel{\ln(0.85)}}{\cancel{\ln(0.85)}}$$

$$\underline{5.6} \text{ yrs} = t$$

St. Dev.

$\{2, 7, 10, 13\}$

$\bar{x} = \frac{32}{4} = 8$

1) Find mean. $-6^2 + -1^2 + 2^2 + 5^2$
2) Data − mean $= \sqrt{\frac{66}{4}}$
3) Square difference $\approx \boxed{4.06}$
4) Find mean of squares
5) $\sqrt{}$

Outliers

$IQR = Q_3 - Q_1$

$IQR * 1.5 = \#$

Lower boundary $= Q_1 - \#$

Upper boundary $= Q_3 + \#$

33 #'s

$\frac{33}{2} = 16.5 = 17^{th}$

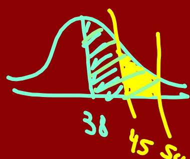
8^{th} 9^{th} 17^{th} 8^{th} 9^{th}

$\frac{16}{2} = 8$ & 9

population data — Normal Distribution

$z = \frac{x - \mu}{\sigma}$ ← cannot be used for samples!

The number of text messages sent by 800 teens at Chaparral HS is normally distributed with a mean of 38 + a st. dev of 7. How many teens send between 45 + 50 texts per day?



$z = \frac{45 - 38}{7} = 1.00$ .3413

$z = \frac{50 - 38}{7} = \frac{12}{7} = 1.71$ .4564

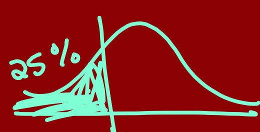
0.1151

$* 800$

92.1

$\approx$ 92 students

What number of text messages is the cutoff line for the lowest 25%?



Find raw score

$z = \frac{x - \mu}{\sigma}$

z	Col. C
0.69 ←	0.2500

$7 \cdot -0.67 = \frac{x - 38}{7} \cdot 7$

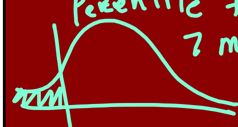
$-4.69 = x - 38$

$+38$

$33.31 = x$

$\approx$ 33 messages

Percentile for 7 mess/day



$z = \frac{7 - 38}{7}$

Confidence Intervals – For SAMPLES

$\sigma_{\bar{x}} = \frac{s}{\sqrt{n}}$

$E = z \cdot \sigma_{\bar{x}}$

$\bar{x} \pm E$

90% conf.

A sample of 64 families in an upper class area of L.A. found the mean amount spent for Christmas gifts per family member was \$8000. with a st. dev of \$1000. Find a 90% conf. interval.

$\sigma_{\bar{x}} = \frac{s}{\sqrt{n}} = \frac{1000}{\sqrt{64}} = 125$

$E = z \cdot \sigma_{\bar{x}}$

$E = 1.65 \cdot 125$

$E = \$206.25$

8000 ± 206.25

\$7793.75 – \$8206.25

December 13, 2023

PROBABILITY

Combinations

No Repl.

No Order

Dep.

Indiv.

Has Repl.

Has Order

Indep

Binomial

Indep.

2 possible outcomes

Conditional

$$P(A|B) = \frac{P(AB)}{P(B)}$$

_____ OR _____

\+

Look out for overlaps

Expected Value = (prob.)(gain/loss)

Event		
Prob		
Gain/Loss		