

# 2<sup>nd</sup> Semester Final Exam Notesheet

Name \_\_\_\_\_ Per \_\_\_\_\_

## Unit AA4 Logarithms and Exponential Functions

Log to Exp

$$\log_7(49) = x$$

$$49 = 7^x$$

Exp to Log

$$5^x = 76$$

$$x = \log_5 76$$

Log Equations

$$\log_3(x+4) = 2$$

$$x+4 = 3^2$$

$$x+4 = 9$$

$$-4 \quad -4$$

$$x = 5$$

Exponential equations

$$10 \cdot 3^x + 8 = 2008$$

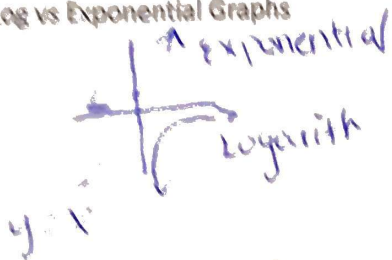
$$-8 \quad -8$$

$$\frac{10 \cdot 3^x}{10} = \frac{2000}{10}$$

$$3^x = 200$$

$$x = \log_3 200 = 4.8$$

Log vs Exponential Graphs



reflections of each other, have asymptotes

Log Equation/Graph

$$y = \log_b(x-h) + k$$

h = Left/right asymptote (vertical)

k = up/down

Exponential Equation/Graph

$$y = b^{(x-h)} + k$$

h = Left/right  
k = a asymptote up/down

## Unit AA5 Unit Circle and Trigonometric Functions

Degrees to Radians

$$215^\circ \cdot \frac{\pi}{180} = \frac{215\pi}{180} = \frac{43\pi}{36}$$

Radians to Degrees

$$\frac{3\pi}{5} \cdot \frac{180}{\pi} = 108^\circ$$

Reference Angles

$$180 - \theta$$

$$180$$

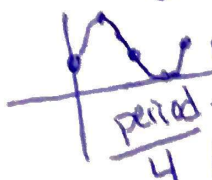
$$\theta - 180$$

Sine Equation/Graph

$$y = a \sin(bx) + k$$

amplitude (positive)

$$\text{period} = \frac{360}{b} = \frac{2\pi}{b}$$



Doesn't change

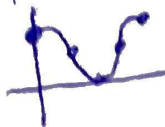
$$360 - \theta, 360$$

Cosine Equation/Graph

$$y = a \cos(bx) + k$$

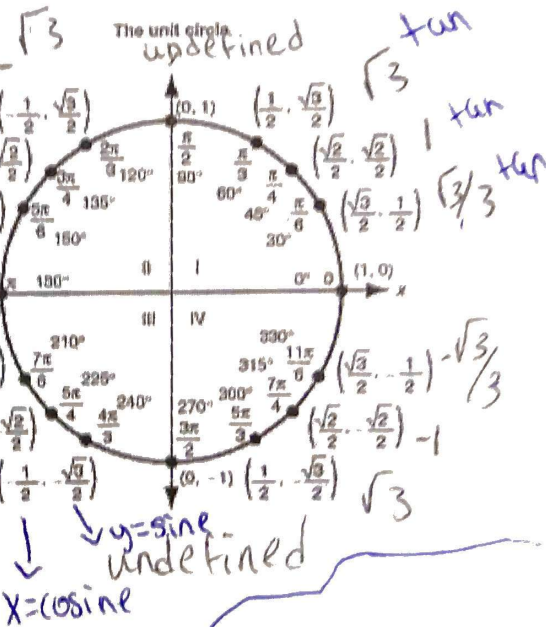
amp

midline



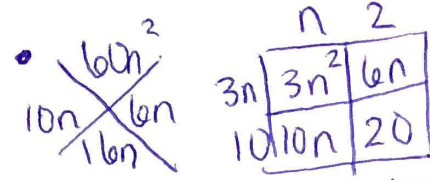
x	y
0	midline
	max = midline + amp
	midline
	min = mid - amp

x	y
0	max
	midline
	minimum
	midline
	max



$\frac{5x+35}{5} = 5(x+7) * \frac{2n+4}{2} = 2(n+2)$

Unit AA6 Polynomials and Rational Expressions



Multiply Polynomials

$(-5x-2)(8x^2+3x-10)$

	$8x^2$	$3x$	$-10$
$-5x$	$-40x^3$	$-15x^2$	$50x$
$-2$	$-16x^2$	$-6x$	$20$

$-40x^3 - 31x^2 + 44x + 20$

Add Rational Expressions

$\frac{n+3}{3n^2+11n+20} + \frac{n+1}{3n^2+11n+20}$

$* \frac{2n+4}{3n^2+11n+20}$

$\frac{2(n+2)}{(3n+10)(n+2)} = \frac{2}{3n+10}$

Multiply/Divide Rational Expressions

$\frac{5x+35}{x} \cdot \frac{3x}{x^2+10x+21}$

$\frac{5(x+7)}{x} \cdot \frac{3x}{(x+7)(x+3)}$

$\frac{15}{x+3}$

Divide Polynomials

$x^3 - 2x^2 - 30x + 14$  divided by  $x+5$

$-5 \overline{) 1 \ -2 \ -30 \ 14}$

$\downarrow -5 \ 35 \ -25$

$1 \ -7 \ 5 \ -11$

$1x^2 - 7x + 5 - \frac{11}{x+5}$

End Behavior

odd(+)

$x \rightarrow \infty, f(x) \rightarrow \infty$

$x \rightarrow -\infty, f(x) \rightarrow -\infty$

odd(-)

$x \rightarrow \infty, f(x) \rightarrow -\infty$

$x \rightarrow -\infty, f(x) \rightarrow \infty$

How to find Roots

even(+)

$x \rightarrow \infty, f(x) \rightarrow \infty$

$x \rightarrow -\infty, f(x) \rightarrow \infty$

even(-)

$x \rightarrow \infty, f(x) \rightarrow -\infty$

$x \rightarrow -\infty, f(x) \rightarrow -\infty$

Equations from Graphs - find (a)

1. Find x-intercepts
2. Plug in point (y-intercept)
3. make sure to identify cross, bounce  $(x-1)^2$  or wiggle  $(x-1)^3$
4. solve for a
5. rewrite

$(4-9i)^2 = (4-9i)(4-9i)$

$16 - 36i - 36i + 81i^2$

$16 - 72i - 81$

$-65 - 72i$

Unit AA7 Imaginary and Complex Numbers

Patterns of i

$i^1 = i$  0.25

$i^2 = -1$  0.5

$i^3 = -i$  0.75

$i^4 = 1$  evenly

$i^{\frac{43}{4}} = 10.75 = -i$

Multiply and Add with i

$(-7+5i)(-4-3i)$

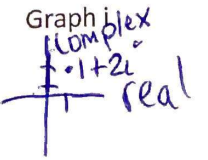
$28 + 21i - 20i - 15i^2$

$43 + i$

$10i(7-4i) - 3i(-5+9i)$

$70i - 40i^2 + 15i^2 = 27i^2$

$67 + 85i$



Equations in standard form

roots  $= 3+2i$

$3-2i$

$(x-(3+2i))(x-(3-2i))$

$(x-3-2i)(x-3+2i)$

How to find roots from equation and graph

$x^2 - 4x + 29 = 0$

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

$= \frac{4 \pm \sqrt{(-4)^2 - 4(1)(29)}}{2(1)}$

$= \frac{4 \pm \sqrt{16 - 116}}{2} = \frac{4 \pm \sqrt{-100}}{2}$

$= \frac{4 \pm 10i}{2}$

x	$x^2$	$-3x$	$21x$	
$-3$	$-3x$	$9$	$-6x$	$= x^2 - 6x + 13$
$-2i$	$-2ix$	$6i$	$-4i^2 = 4$	

$x \quad -3 \quad 2i$

Unit AA8

Normal distribution with bell curve

