We will finish up last class' lesson before going over any problems on the worksheet. So get ready to begin after Ms. Hansen takes attendance!

① $(x^6+x^4)(-4x^2-4)=0$

$x^4(x^2+1)(-4)(x^2+1)=0$

$(x^2+1)(x^4-4)=0$

$(x^2+1)(x^2-2)(x^2+2)=0$

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

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

BTW: $(x^2+1)=(x+i)(x-i)$

$x^2+1=0$

$\sqrt{x^2}=\sqrt{-1}$

$x=\pm\sqrt{-1}$

$x=\pm i$

Sum of Cubes: $(x^3+y^3)=(x+y)(x^2-xy+y^2)$

Difference of Cubes: $(x^3-y^3)=(x-y)(x^2+xy+y^2)$

(11) $16u^3+250 = 2(8u^3+125)$ $x=2u$, $y=5$

$=2(2u+5)(4u^2-10u+25)$

2 log problems from before...

$$\frac{5^x - 5^{-x}}{5^x + 5^{-x}} = \frac{1}{8} \rightarrow \frac{\frac{5^x}{5^x}\cdot 5^x - \frac{1}{5^x}}{\frac{5^x}{5^x}\cdot 5^x + \frac{1}{5^x}} = \frac{1}{8}$$

$$\frac{\frac{5^{2x}-1}{5^x}}{\frac{5^{2x}+1}{5^x}} = \frac{1}{8} \rightarrow \frac{5^{2x}-1}{5^x}\cdot\frac{5^x}{5^{2x}+1} = \frac{1}{8}$$

$$\frac{5^{2x}-1}{5^{2x}+1} = \frac{1}{8} \rightarrow 8(5^{2x}-1) = 1(5^{2x}+1)$$

$2^3 \cdot 2^4 = 2^{3+4}$

$5^x \cdot 5^x = 5^{2x}$

$$8\cdot 5^{2x} - 8 = 5^{2x} + 1$$
$$-5^{2x} + 8 \quad -5^{2x} + 8$$
$$8\cdot 5^{2x} - 5^{2x} = 9$$
$$7\cdot 5^{2x} = 9$$
$$\frac{7\cdot 5^{2x}}{7} = \frac{9}{7}$$
$$\ln 5^{2x} = \ln\left(\frac{9}{7}\right)$$
$$\frac{2x\ln 5}{2\ln 5} = \frac{\ln\left(\frac{9}{7}\right)}{2\ln 5}$$

$$x = \frac{\ln 9 - \ln 7}{2\ln 5} \approx 0.078$$

$$(\log_3 x)^2 - \log_3 x^2 = 3$$

Rational functions:

polynomial / polynomial

Simplifying rational functions:

We can ONLY simplify FACTORS out of BOTH the numerator & denominator.

factor first

Multiplying/dividing:

- mult. straight across
- ÷ - mult. first fraction by the reciprocal of second fraction

EXAMPLES: Find the product or quotient.

$$\frac{x^2+11x+30}{x^2+15x+56}\cdot\frac{x^2+4x-32}{3x^2+18x}=$$

$$\frac{(x+5)(x+6)(x+8)(x-4)}{(x+7)(x+8)(3x)(x+6)}$$

$$\frac{(x+5)(x-4)}{3x(x+7)}$$

$$\frac{(2x+1)(x+2)}{2x^2+5x+2}$$

$$(2x^2+4x)+(x+2)$$

$$2x(x+2)+1(x+2)$$

$$(x+2)(2x+1)$$

$$\frac{2x+1}{16x^2}\div\frac{2x^2+5x+2}{4x^3+4x}=$$

$$\frac{(2x+1)(4x)(x^2+4)}{(16x^2)(x+2)(2x+1)}$$

$$\frac{(x^2+4)}{4x(x+2)}$$

Adding/subtracting:

+ or − numerators over like denominators

EXAMPLES: Find the sum or difference.

LCD: $6x^2$

$\frac{2x}{2x}\cdot\frac{2}{3x}+\frac{3}{2x^2}\cdot\frac{3}{3}=\frac{4x+9}{6x^2}$

LCD: $(x+1)(x-3)$

$\left(\frac{x-3}{x-3}\right)\frac{3}{x+1}-\frac{2}{x-3}\left(\frac{x+1}{x+1}\right)=$

$\frac{3x-9-2x-2}{(x-3)(x+1)}=$

$\frac{x-11}{(x-3)(x+1)}$

LCD: $(x+4)(x-3)(x+1)$

$\frac{x-2}{x^2+x-12}-\frac{x}{x^2-2x-3}=$

$\frac{(x-2)}{(x+4)(x-3)}\cdot\frac{(x+1)}{(x+1)}\quad\frac{x}{(x-3)(x+1)}\cdot\frac{(x+4)}{(x+4)}$

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

Simplifying complex fractions:

- common denominator
- mult. numerator by reciprocal of denominator

EXAMPLES: Simplify.

$$\frac{\frac{1}{2}+\frac{2}{x-6}}{\frac{3x-6}{x^2-12x+36}}$$

$\frac{x-6}{x-6}$ $\cdot$ $\frac{2}{2}$

$$= \frac{\frac{x-6+4}{2(x-6)}}{\frac{3(x-2)}{(x-6)(x-6)}} = \frac{(x-2)}{2(x-6)} \cdot \frac{(x-6)(x-6)}{3(x-2)} = \boxed{\frac{x-6}{6}}$$

$$\frac{\frac{x-3}{x^3}-\frac{2}{x^3-x^2}}{\frac{1}{2}-\frac{1}{x^2}}$$

$\frac{(x-1)}{(x-1)}$ $\frac{(x-3)}{x^3} - \frac{2}{x^2(x-1)}\frac{x}{x} \div \left(\frac{1}{2}\frac{x^2}{x^2} - \frac{1}{x^2}\frac{2}{2}\right) =$

$$\frac{x^2-4x+3-2x}{x^3(x-1)} \div \left(\frac{x^2-2}{2x^2}\right) = \frac{(x^2-6x+3)(2x^2)}{x^3(x-1)(x^2-2)}$$

$$= \boxed{\frac{(x^2-6x+3)2}{x(x-1)(x^2-2)}}$$

Questions on the worksheet?

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Trigonometric Functions

Angle measure:

radians (2π full circle)

degrees ($360°$ full circle)

Change . . .

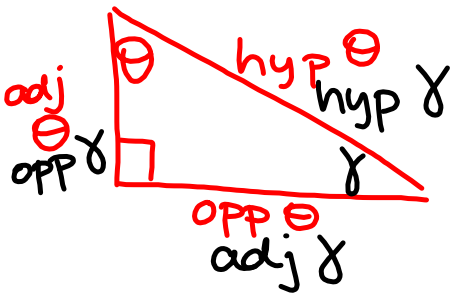
165° to radians

$\frac{165°}{1} \cdot \frac{\pi}{180°} = \frac{11\pi}{12}$

$\frac{5\pi}{6}$ radians to degrees

$\frac{5\pi}{6} \cdot \frac{180°}{\pi} = 150°$

Right triangle trig ratios:



$\sin\theta = \frac{opp}{hyp}$

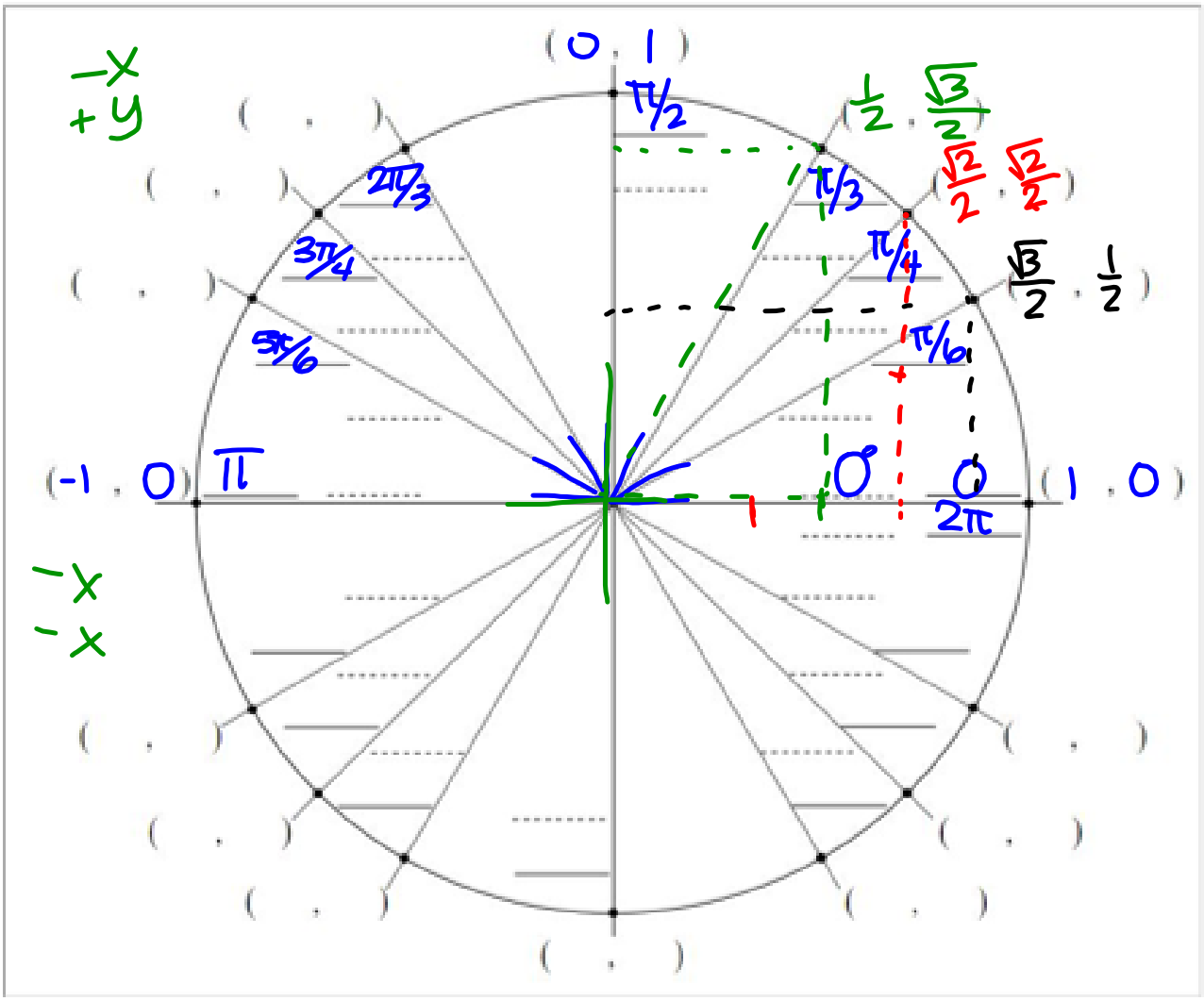
$\cos\theta = \frac{adj}{hyp}$

$\tan\theta = \frac{opp}{adj}$

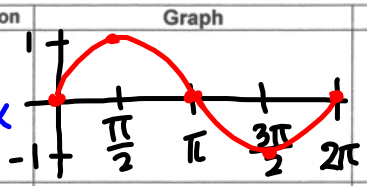
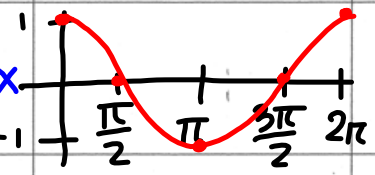
Finding trig ratios for angles greater than 90°:

- look for ∠s in same position or use calculator

Unit Circle $(\cos\theta, \sin\theta)$



How to know the trig functions of the unit circle angles without memorizing a lot of stuff:

Parent Function	Graph	Domain	Range	Even/Odd	Transformations
$y=\sin x$					$y=A\cdot \begin{matrix}\sin\\ \cos\\ \tan\\ \csc\\ \sec\\ \cot\end{matrix}(B(x-C))+D$
$y=\cos x$					$\lvert A\rvert$ = amplitude B = cycles from 0 to 2π period = $\frac{2\pi}{B}$ C = horizontal or phase shift D = vertical shift (midline)
$y=\tan x$					
$y=\csc x$					
$y=\sec x$					
$y=\cot x$					

Inverse Trigonometric Functions

Inverse trig functions:

EXAMPLES

1. Find the exact value of . . .

a. $\sin^{-1}\frac{\sqrt{3}}{2}$

b. $\tan^{-1}-1$

c. $\cos^{-1}0$

d. $\sin^{-1}\left(\sin\frac{3\pi}{4}\right)$

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2. Find all six trig functions of the angle θ if $\theta = \sin^{-1}\frac{4}{5}$.

3. Evaluate $\cos\left(\tan^{-1}\frac{6}{11}\right)$.

Inverse trig functions on the calculator:

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Trigonometric identities you must know:

Odd and even trig functions:

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Homework

1.6 pg.51-52 #1-17, 25-35 odds

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