PC 12 Session 21

Monday, April 4, 2022 1:31 PM

Pre-Calculus 12 Session 21
Tuesday, April 5, 2022

1. Last Day's Homework:
   - Textbook Practice: Section 6.2: pages 305-308, Practise 1a), d), e), 2a), c), 4a), c), e), 8a), c), e), 9, 10, 11a), b), 16, 17, 19a), 20a), c) (if you have not already done so), Section 6.3: pages 314-s315, Practise 1a), b), 2b), d), 3a), c), 5, 7, 8, 10b), c) 11a), c), 12a), 15, 18.
   - Readings: Section 7.1 (pages 334 to 342), Section 7.2 (pages 346 to 354), Section 7.3 (pages 358 to 363.
   - Hand-in Assignments and other things: NOTE: The Chapter 6 Hand-in Assignment will now be due on Thursday, April 7.

2. Return of, and comments on, the Chapter 5 Test

3. More about Section 6.4: Solving Trigonometric Equations Using Identities

4. Section 7.1: Characteristics of Exponential Equations

5. Section 7.2: Transformations of Exponential Functions

Homework: This depends on how far we get today.

Readings: Section 8.1 (pages 372 to 379), Section 8.2 (pages 383 to 389), Section 8.3 (pages 392 to 363.

Practice from the Textbook to try:

Section 6.4: pages 320-321, Practise 1b), c), 2b), c), 3a), b), c), 4, 5, 6, 10, 14, 17.
The Chapter 6 Review on pages 322 to 323.
The Chapter 6 Practice Test on page 324.
Section 7.1: pages 342-344, Practise 1 to 8 inclusive, 11, and C1.
Section 7.2: pages 354 to 356, Practise 1, 2, 3a), d), e), g), 4, 5, 6c), d), 7a), c), 10, 11, 12.

Additionally, you should work through the "Chapter 6 Test" handout that I gave out to you.

Readings from the Textbook: Nothing new.

- **Hand-in Assignments:** The Chapter 6 Hand-in Assignment will now be due on Thursday, April 7.

The Chapter 6 Test will be on ~~Tuesday~~ Thursday, April 12.

No class on Tuesday, Apr. 19.

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6.1 Practice

6. Consider the equation $\frac{\sin x \cos x}{1 + \cos x} = \frac{1 - \cos x}{\tan x}$.

a) What are the non-permissible values, in radians, for this equation?

$x \neq \pi + 2\pi n, n \in I$

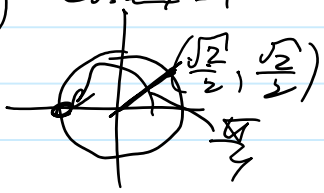
$x \neq \frac{\pi}{2} + \pi n, n \in I$

b) Graph the two sides of the equation using technology, over the domain $0 \leq x < 2\pi$. Could it be an identity?

c) Verify that the equation is true when $x = \frac{\pi}{4}$. Use exact values for each expression in the equation.

$1 + \cos x \neq 0$

$\cos x \neq -1$

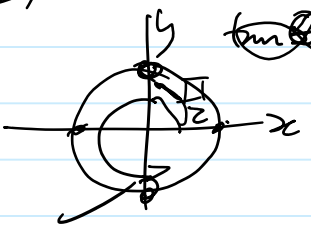


$\tan x \neq 0$

$\tan x = 0$

when $x = \frac{\pi}{2}$

$\tan\left(\frac{\pi}{4}\right) = \frac{1}{1}$



$\frac{\sin\frac{\pi}{4}\cos\frac{\pi}{4}}{1+\cos\frac{\pi}{4}} \stackrel{?}{=} \frac{1-\cos\frac{\pi}{4}}{\tan\frac{\pi}{4}}$

$\frac{\frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2}}{1+\frac{\sqrt{2}}{2}} \stackrel{?}{=} \frac{1-\frac{\sqrt{2}}{2}}{1}$

$0.292893 = 0.292893$

$\frac{\frac{2}{4}}{\frac{2}{2}+\frac{\sqrt{2}}{2}} \stackrel{?}{=} 1-\frac{\sqrt{2}}{2}$

$\frac{\frac{1}{2}}{\frac{2+\sqrt{2}}{2}} \stackrel{?}{=} 1-\frac{\sqrt{2}}{2}$

$\frac{1}{2} \div \frac{2+\sqrt{2}}{2} \stackrel{?}{=} 1-\frac{\sqrt{2}}{2}$

$\frac{1}{2} \times \frac{2}{2+\sqrt{2}} \stackrel{?}{=} \text{RHS}$

$\frac{2}{4+2\sqrt{2}} = \frac{2}{2} - \frac{\sqrt{2}}{2}$

$\frac{1}{2+\sqrt{2}} = \frac{2-\sqrt{2}}{2}$

$\frac{2-\sqrt{2}}{2-\sqrt{2}} \times \frac{1}{2+\sqrt{2}} = \frac{2-\sqrt{2}}{2} \times \frac{2+\sqrt{2}}{2+\sqrt{2}}$

$\frac{2-\sqrt{2}}{2(2-\sqrt{2})(2+\sqrt{2})}$

$\frac{2-\sqrt{2}}{2} =$

How ugly is this?

$1 = 2-\sqrt{2}$

$\frac{2-\sqrt{2}}{4-2} =$

$\frac{2-\sqrt{2}}{2} = \frac{2-\sqrt{2}}{2}$

$\frac{1}{2+\sqrt{2}} = \frac{2-\sqrt{2}}{2}$

$\frac{1}{2+\sqrt{2}} \times \frac{(2-\sqrt{2})}{(2-\sqrt{2})} =$ ——

or

$\frac{1}{2+\sqrt{2}} = \frac{2-\sqrt{2}}{2} \times \frac{(2+\sqrt{2})}{(2+\sqrt{2})}$

2. Verify the following identity algebraically, for $x = \frac{\pi}{4}$

$$\frac{1-\sin x}{\cos x} = \frac{\cos x}{1+\sin x}$$

Ch. 6 Hmwk

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$\frac{1-\sin\frac{\pi}{4}}{\cos\frac{\pi}{4}} = \frac{\cos\frac{\pi}{4}}{1+\sin\frac{\pi}{4}}$

$\frac{1-\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = \frac{\frac{\sqrt{2}}{2}}{1+\frac{\sqrt{2}}{2}}$

0.4142135... 0.4142135...

evaluate both sides w/ a calculator to show that they're equal

Practise

1. Write each expression as a single trigonometric function.

a) $\cos 43° \cos 27° - \sin 43° \sin 27°$

b) $\sin 15° \cos 20° + \cos 15° \sin 20°$

c) $\cos^2 19° - \sin^2 19°$

d) $\sin\frac{3\pi}{2}\cos\frac{5\pi}{4} - \cos\frac{3\pi}{2}\sin\frac{5\pi}{4}$

e) $8\sin\frac{\pi}{\cos\frac{\pi}{}}$ $= 4[2\sin\frac{\pi}{}\cos\frac{\pi}{}]$

$2\sin\theta\cos\theta = \sin 2\theta$

$8\sin\theta\cos\theta = 4\times(2\sin\theta\cos\theta)$

$= 4\sin 2\theta.$

d) $\sin\frac{3\pi}{2}\cos\frac{5\pi}{4} - \cos\frac{3\pi}{2}\sin\frac{5\pi}{4}$

e) $8\sin\frac{\pi}{3}\cos\frac{\pi}{3}$ $= 4\left[2\sin\frac{\pi}{3}\cos\frac{\pi}{3}\right]$ $= 4\sin 2\theta.$

$\sin[2(\frac{\pi}{3})]$ $\theta = \frac{\pi}{3}.$

$= 4\sin\left(\frac{2\pi}{3}\right).$

More about Chapter 6.

Section 6.4: Solving Equations Using Identities.

Chapter 7: Exponential Functions
8: Logarithmic Functions

What is an exponential function?

It's a function where "x" is in an exponent of a number.

exponent $x \in R$

Basic form: $y = b^x$

b = base. $b > 0, b \neq 1$

$-[5^{0.5}]$ different $(-5)^{0.5}$

$y = 0^2 = 0$ $\quad -- = 4, -3, -2, -1, 0, 1, 2, 3, 4, \ldots$

$0^0 = ??$ $\quad$ undefined $\quad 0^2\ 0^3\ 0^4$

$0\ 0\ 0\ 0$

$1^{\square} = 1$

$(\text{anything}>0)^0 = 1$

except 0^0 or a $(-x)^0$

Meaning of exponents and Laws of exponents

$2^1 = 2$ $\quad 2^0 = 1$

$2^2 = 2 \cdot 2 = 4$

$2^7 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$b^{-n} = \frac{1}{b^n}$ $\quad$ $b^n = \frac{1}{b^{-n}}$

$b^{-n} = \frac{1}{b^n}$ $\quad$ eg $7^{-5} = \frac{1}{7^5}$

$\frac{1}{7^{-5}}$ $\quad 7^5 = 7^{-(-5)} = \frac{1}{7^{-5}}$

$\left(\frac{2^3 \times 3^2}{5^2}\right)^{-3}$

$2^{-3} \times 5^2 \times 3^{-2}$

$\frac{2^3 \times 3^2 \times 5^{-2}}{1}$

multiply

$(b^m)^n = b^{m \times n}$

add

$b^m \times b^n = b^{m+n}$

$(ab)^m = a^m b^m$

$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

$\left(\frac{5}{8}\right)^{-2}$ $\quad \left(\frac{8}{5}\right)^2 = \frac{8^2}{5^2} = \frac{64}{25}$

$\frac{5^{-2}}{8^{-2}} = \frac{8^2}{5^2} = \frac{64}{25}$

The exponent laws are quite important a little later in Ch 7, and re-appear in Ch 8.