

*Talk to your Guidance Counselor TODAY to sign up for
A Computer Science Principles Class Next Year!*



*Introductory Class
No Computer Science
experience necessary*

Prerequisite: Algebra I

*Students do not need to have prior
knowledge of any programming language.*

<https://www.youtube.com/watch?v=jQm0z894CG0>



Jan 23-7:26 PM

11. $\tan(5u)$

16. $-\frac{24}{25}$

12. $\sin(4x)$

17. $\frac{-3\sqrt{34}}{34}$

13. $\frac{\sqrt{2}}{2}$

18. $\frac{3\sqrt{10}}{10}$ if you used $-\frac{4}{5}$. If you used $+\frac{4}{5}$, then ans = $\frac{\sqrt{10}}{10}$.

14. $-\frac{\sqrt{3}}{3}$

19. $\sqrt{\frac{2-\sqrt{3}}{4}}$ or $\frac{\sqrt{2-\sqrt{3}}}{2}$

15. $-\frac{7\sqrt{2}}{10}$

20. a. $\frac{84}{85}$

b. $-\frac{77}{85}$

c. $\frac{84}{13}$

Worksheet 7.1

Tomorrow Quiz (no calc)
Finish Class Group Work for HW

$$\textcircled{1} \frac{\tan(u) + \tan(4u)}{1 - \tan(u)\tan(4u)} \\ = \tan(u+4u) = \tan(5u)$$

$$\textcircled{2} \sin(x)\cos(3x) + \cos(x)\sin(3x) \\ = \sin(x+3x) = \sin(4x)$$

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Worksheet 7.1

11. $\tan(5u)$ 16. $-\frac{24}{25}$

12. $\sin(4x)$ 17. $\frac{-3\sqrt{34}}{34}$

13. $\frac{\sqrt{2}}{2}$ 18. $\frac{3\sqrt{10}}{10}$

14. $-\frac{\sqrt{3}}{3}$ 19. $\sqrt{\frac{2-\sqrt{3}}{4}}$ or $\frac{\sqrt{2-\sqrt{3}}}{2}$

15. $-\frac{7\sqrt{2}}{10}$ 20. a. $\frac{84}{85}$
b. $-\frac{77}{85}$
c. $\frac{84}{13}$

(16) $\cos \theta = \frac{4}{5}$

$3\pi \leq \theta < 2\pi$



$\sin 2\theta = 2 \sin \theta \cos \theta$
 $= 2\left(-\frac{3}{5}\right)\left(\frac{4}{5}\right) = -\frac{24}{25}$

(14) $\frac{\tan \frac{8\pi}{9} - \tan \frac{\pi}{18}}{1 + \tan\left(\frac{8\pi}{9}\right)\tan\left(\frac{\pi}{18}\right)} = \frac{-\frac{24}{25}}{\frac{13}{13}}$

$= \tan\left(\frac{8\pi}{9} - \frac{\pi}{18}\right) = \tan\left(\frac{16\pi}{18} - \frac{\pi}{18}\right)$
 $= \tan\left(\frac{15\pi}{18}\right) = \tan \frac{5\pi}{6} = -\tan \frac{\pi}{6} = -\frac{\sqrt{3}}{3}$



Jan 2-12:12 PM

(15) $\sin \theta = -\frac{7}{25}$, $\frac{3\pi}{2} \leq \theta < 2\pi$

$\cos\left(\frac{\theta}{2}\right) = \pm \sqrt{\frac{1+\cos \theta}{2}}$

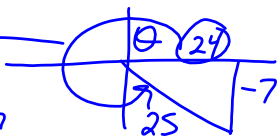
$= -\sqrt{\frac{1+\frac{24}{25}}{2}}$

$= -\sqrt{\frac{\frac{49}{25} \cdot \frac{1}{2}}{2}} = -\sqrt{\frac{49}{50}} = -\frac{7}{\sqrt{50} \sqrt{2}}$

$= -\frac{7}{5\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = -\frac{7\sqrt{2}}{5 \cdot 2} = -\frac{7\sqrt{2}}{10}$

$\frac{1}{2}\theta \rightarrow \frac{3\pi}{4} \leq \frac{\theta}{2} < \pi$

$\cos -$



$$(19) \sin \frac{\pi}{12} = \sin\left(\frac{1}{2} \cdot \frac{\pi}{6}\right) \rightarrow \sin\left(\frac{1}{2}\theta\right), \theta = \frac{\pi}{6}$$

$$\sin\left(\frac{1}{2} \cdot \frac{\pi}{6}\right) = \pm \sqrt{\frac{1 - \cos \pi/6}{2}} = + \sqrt{\frac{1 - \sqrt{3}/2}{2}} = \sqrt{\frac{2 - \sqrt{3}}{2}}$$

$$= \sqrt{\frac{2 - \sqrt{3}}{2} \cdot \frac{1}{2}} = \sqrt{\frac{2 - \sqrt{3}}{4}} = \frac{\sqrt{2 - \sqrt{3}}}{2}$$

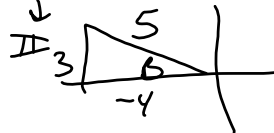
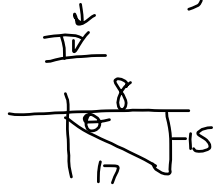
$$2\left(\frac{\pi}{12}\right) = \left(\frac{1}{2}\theta\right)^2$$

$$2\left(\frac{\pi}{12}\right) = \left(\frac{1}{2}\theta\right)^2$$

$$\theta = \frac{2\pi}{12} = \frac{\pi}{6}$$

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$$(20) \cos \theta = 8/17, \tan \beta = -3/4$$



$$a) \sin(\theta + \beta) = \sin \theta \cos \beta + \cos \theta \sin \beta$$

$$= \left(-\frac{15}{17}\right)\left(-\frac{3}{5}\right) + \left(\frac{8}{17}\right)\left(\frac{4}{5}\right) = \frac{60 + 32}{85} = \frac{92}{85}$$

$$b) \cos(\theta + \beta) = \cos \theta \cos \beta - \sin \theta \sin \beta$$

$$= \left(\frac{8}{17}\right)\left(\frac{4}{5}\right) - \left(-\frac{15}{17}\right)\left(\frac{3}{5}\right) = \frac{32 + 45}{85} = \frac{77}{85}$$

$$c) \tan(\theta + \beta) = \frac{\tan \theta + \tan \beta}{1 - \tan \theta \tan \beta}$$

$$= \frac{\left(-\frac{15}{8} + \frac{3}{4}\right) \frac{8 \cdot 4}{1}}{\left(1 - \left(-\frac{15}{8}\right)\left(\frac{3}{4}\right)\right) \frac{8 \cdot 4}{1}} = \frac{-60 - 24}{32 - 45} = \frac{-84}{-13} = \frac{84}{13}$$

Jan 25-9:44 AM

Groupwork Key will be posted online later today.

Check it before coming to class tomorrow.

Small quiz tomorrow (no calculator) in addition to notes.

Know your 6 formulas and the 4 triples:

3-4-5, 5-12-13, 8-15-17, 7-24-25

Name _____

Group Work/Homework

PreCalc

Unit 7 Day 4

NO CALCULATORS! You must use a formula for EVERY question.

Complete the formulas below:

$$\sin(A + B) = \sin A \cos B + \cos A \sin B \quad \cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B \quad \cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} \quad \tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

1. Simplify:

a. $\cos(A + \pi)$

$$= \cos A \cos \pi - \sin A \sin \pi$$

$$= \cos A \cdot (-1) - \sin A \cdot (0)$$

$$= -\cos A$$

b. $\sin\left(B - \frac{\pi}{2}\right)$

$$= \sin B \cos \frac{\pi}{2} - \cos B \sin \frac{\pi}{2}$$

$$= \sin B(0) - \cos B(1)$$

$$= -\cos B$$

c. $\tan\left(x + \frac{\pi}{3}\right)$

$$= \frac{\tan x + \tan \frac{\pi}{3}}{1 - \tan x \tan \frac{\pi}{3}}$$

$$= \frac{\tan x + \sqrt{3}}{1 - \sqrt{3} \tan x}$$

d. $\sin\left(x + \frac{\pi}{2}\right) - \cos\left(x + \frac{3\pi}{2}\right)$

$$\text{Aside } \sin\left(x + \frac{\pi}{2}\right) = \sin x \cos \frac{\pi}{2} + \cos x \sin \frac{\pi}{2}$$

$$= \sin x(0) + \cos x(1)$$

$$= \cos x$$

$$\cos\left(x + \frac{3\pi}{2}\right) = \cos x \cos \frac{3\pi}{2} - \sin x \sin \frac{3\pi}{2}$$

$$= \cos x(0) - \sin x(-1)$$

$$= \sin x$$

$$\therefore = \cos x - \sin x$$

Jan 22-7:35 AM

2. Simplify. Find the exact value.

a. $\sin\left(\frac{\pi}{9}\right) \cos\left(\frac{2\pi}{9}\right) + \cos\left(\frac{\pi}{9}\right) \sin\left(\frac{2\pi}{9}\right)$

$$\sin(x+y)$$

$$= \sin\left(\frac{\pi}{9} + \frac{2\pi}{9}\right) = \sin\left(\frac{3\pi}{9}\right) = \sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

b. $\cos\left(\frac{5\pi}{9}\right) \cos\left(\frac{\pi}{18}\right) + \sin\left(\frac{5\pi}{9}\right) \sin\left(\frac{\pi}{18}\right)$

$$\cos(x-y)$$

$$= \cos\left(\frac{5\pi}{9} - \frac{\pi}{18}\right) = \cos\left(\frac{10\pi}{18} - \frac{\pi}{18}\right)$$

$$= \cos\left(\frac{9\pi}{18}\right) = \cos \frac{\pi}{2} = 0$$

c. $\frac{\tan\left(\frac{\pi}{6}\right) + \tan\left(\frac{\pi}{12}\right)}{1 - \tan\left(\frac{\pi}{6}\right) \tan\left(\frac{\pi}{12}\right)}$

$$\tan(x+y)$$

$$= \tan\left(\frac{\pi}{6} + \frac{\pi}{12}\right) = \tan\left(\frac{2\pi}{12} + \frac{\pi}{12}\right)$$

$$= \tan\left(\frac{3\pi}{12}\right) = \tan \frac{\pi}{4} = 1$$

e. $\sin\left(\frac{11\pi}{6}\right) \cos\left(\frac{2\pi}{3}\right) - \cos\left(\frac{11\pi}{6}\right) \sin\left(\frac{2\pi}{3}\right)$

$$\sin(x-y)$$

$$\sin\left(\frac{11\pi}{6} - \frac{2\pi}{3}\right) = \sin\left(\frac{11\pi}{6} - \frac{4\pi}{6}\right)$$

$$= \sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$$

d. $\cos\left(\frac{13\pi}{12}\right) \cos\left(\frac{\pi}{4}\right) - \sin\left(\frac{13\pi}{12}\right) \sin\left(\frac{\pi}{4}\right)$

$$\cos(x+y)$$

$$= \cos\left(\frac{13\pi}{12} + \frac{\pi}{4}\right) = \cos\left(\frac{13\pi}{12} + \frac{3\pi}{12}\right)$$

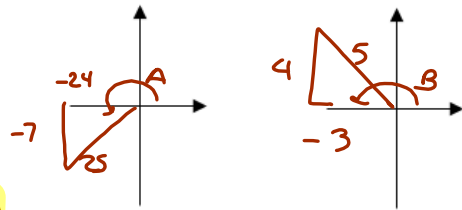
$$= \cos\left(\frac{16\pi}{12}\right) = \cos\left(\frac{4\pi}{3}\right) = -\frac{1}{2}$$

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3. If $\sin A = -\frac{7}{25}$, $\pi \leq A \leq \frac{3\pi}{2}$, $\cos B = -\frac{3}{5}$, and B is in quadrant II, find each of the following: (you MUST draw triangles!)

a. $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$

$$= \frac{\frac{-24}{7} - \left(-\frac{4}{3}\right)}{1 + \left(\frac{-24}{7}\right)\left(-\frac{4}{3}\right)} = \frac{-\frac{24}{7} + \frac{4}{3}}{1 + \frac{32}{7}} = \frac{-\frac{24}{7} + \frac{4}{3}}{\frac{7+32}{7}} = \frac{-\frac{24}{7} + \frac{4}{3}}{\frac{39}{7}} = \frac{-24 + \frac{4 \cdot 7}{3}}{39} = \frac{-24 + \frac{28}{3}}{39} = \frac{-\frac{72}{3} + \frac{28}{3}}{39} = \frac{-\frac{44}{3}}{39} = -\frac{44}{117}$$



b. $\sin(A + B) = \sin A \cos B + \cos A \sin B$
 $= \left(-\frac{7}{25}\right)\left(-\frac{3}{5}\right) + \left(-\frac{24}{25}\right)\left(\frac{4}{5}\right)$
 $= \frac{21}{125} - \frac{96}{125} = -\frac{75}{125} = -\frac{3}{5}$

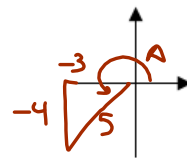
c. $\cos(A + B) = \cos A \cos B - \sin A \sin B$
 $= \left(-\frac{24}{25}\right)\left(-\frac{3}{5}\right) - \left(-\frac{7}{25}\right)\left(\frac{4}{5}\right)$
 $= \frac{72}{125} + \frac{28}{125} = \frac{100}{125} = \frac{4}{5}$

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4. If $\cos A = -\frac{3}{5}$ and $\pi \leq A \leq \frac{3\pi}{2}$, find

a. $\sin 2A = 2 \sin A \cos A$
 $= 2 \left(-\frac{4}{5}\right)\left(-\frac{3}{5}\right) = \frac{24}{25}$

b. $\sin \frac{1}{2}A = \sqrt{\frac{1 - \cos A}{2}}$
 $= \sqrt{\frac{1 - (-\frac{3}{5})}{2}} = \sqrt{\frac{5 - (-3)}{2 \cdot 5}} = \sqrt{\frac{8}{10}} = \sqrt{\frac{4}{5}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$



5. If $\sin A = \frac{1}{\sqrt{5}}$, find $\cos 2A$.

$$\cos 2A = 1 - 2\sin^2 A$$

$$= 1 - 2\left(\frac{1}{\sqrt{5}}\right)^2 = 1 - 2\left(\frac{1}{5}\right)$$

$$= 1 - \frac{2}{5} = \frac{3}{5}$$

6. Find the exact value of $\cos \frac{\pi}{8}$

$$\cos\left(\frac{1}{2} \cdot \frac{\pi}{4}\right) = \sqrt{\frac{1 + \cos \frac{\pi}{4}}{2}}$$

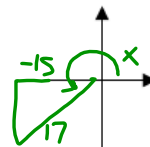
$$\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} \Rightarrow \sqrt{\frac{1 + \frac{\sqrt{2}}{2}}{2}} = \sqrt{\frac{2 + \sqrt{2}}{2 \cdot 2}} = \sqrt{\frac{2 + \sqrt{2}}{4}} = \frac{\sqrt{2 + \sqrt{2}}}{2}$$

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7. If $\tan x = \frac{8}{15}$ and $\pi < x < \frac{3\pi}{2}$, find each of the following:

a. $\sin 2x = 2 \sin x \cos x$
 $= 2 \left(-\frac{8}{17}\right) \left(-\frac{15}{17}\right) = \frac{240}{289}$

b. $\cos 2x$ (Choose Any of the 3)
 $= 1 - 2 \sin^2 x = 1 - 2 \left(-\frac{8}{17}\right)^2 = 1 - 2 \left(\frac{64}{289}\right) = \frac{289}{289} - \frac{128}{289}$



c. $\sin \frac{1}{2}x = \sqrt{\frac{1 - \cos x}{2}}$
 $= \sqrt{\frac{1 - \left(-\frac{15}{17}\right)}{2}} = \sqrt{\frac{17(1) - \left(-\frac{15}{17}\right)17}{2 \cdot 17}}$

d. $\cos \frac{1}{2}x = \sqrt{\frac{1 + \cos x}{2}}$
 $= -\sqrt{\frac{1 + \left(-\frac{15}{17}\right)}{2}}$

$= \sqrt{\frac{17+15}{34}} = \sqrt{\frac{32}{34}} = \sqrt{\frac{16}{17}}$
 $= \frac{4}{\sqrt{17}} = \frac{4\sqrt{17}}{17}$

$= -\sqrt{\frac{17(1) + \left(-\frac{15}{17}\right)17}{2(17)}} = -\sqrt{\frac{17-15}{34}}$
 $= -\sqrt{\frac{2}{34}} = -\sqrt{\frac{1}{17}} = -\frac{1}{\sqrt{17}} = -\frac{\sqrt{17}}{17}$

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