

# Precalculus A

## 5.3 Sum and Difference Identities

### Day 2

### Homework: Assignment #10

D. Paulson

1.  $\sin 42^\circ \cos 17^\circ - \cos 42^\circ \sin 17^\circ$

$$\sin(42-17) = \sin 25$$

2.  $\cos 94^\circ \cos 18^\circ + \sin 94^\circ \sin 18^\circ$

$$\cos(94-18) = \cos 76$$

3.  $\sin \frac{\pi}{5} \cos \frac{\pi}{2} + \sin \frac{\pi}{2} \cos \frac{\pi}{5}$

$$\begin{aligned} \sin\left(\frac{\pi}{5} + \frac{\pi}{2}\right) \\ \frac{2\pi}{10} + \frac{5\pi}{10} \\ \sin\left(\frac{7\pi}{10}\right) \end{aligned}$$

7.  $\cos \frac{\pi}{7} \cos x + \sin \frac{\pi}{7} \sin x$

$$\cos\left(\frac{\pi}{7} - x\right)$$

8.  $\cos \frac{\pi}{7} \cos x - \sin x \sin \frac{\pi}{7}$

$$\cos\left(\frac{\pi}{7} + x\right)$$

9.  $\sin(3x) \cos(x) - \cos(3x) \sin(x)$

$$\begin{aligned} \sin(3x-x) \\ \sin(2x) \end{aligned}$$

10.  $\cos(7y) \cos(3y) - \sin(7y) \sin(3y)$

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$$4. \sin\left(\frac{\pi}{4}\right)\cos\left(\frac{\pi}{7}\right) - \sin\left(\frac{\pi}{7}\right)\cos\left(\frac{\pi}{4}\right)$$

$$\sin\left(\frac{\pi}{4} - \frac{\pi}{7}\right)$$

$$\sin\left(\frac{7\pi}{28} - \frac{4\pi}{28}\right)$$

$$\sin\left(\frac{3\pi}{28}\right)$$

$$5. \frac{\tan 19^\circ + \tan 47^\circ}{1 - \tan 19^\circ \tan 47^\circ}$$

$$\tan(19^\circ + 47^\circ)$$

$$\tan 66^\circ$$

$$6. \frac{\tan\left(\frac{\pi}{6}\right) - \tan\left(\frac{\pi}{3}\right)}{1 + \tan\left(\frac{\pi}{6}\right)\tan\left(\frac{\pi}{3}\right)}$$

$$\tan\left(\frac{\pi}{6} - \frac{\pi}{3}\right)$$

$$\tan\left(-\frac{\pi}{6}\right)$$

$$\frac{2\pi}{15} - \frac{6\pi}{15}$$

$$10. \cos(7y)\cos(3y) - \sin(7y)\sin(3y)$$

$$\cos(7y + 3y)$$

$$\cos(10y)$$

$$11. \frac{\tan 2y + \tan 3x}{1 - \tan 2y \tan 3x}$$

$$\tan(2y + 3x)$$

$$12. \frac{\tan 3a - \tan 2b}{1 + \tan 3a \tan 2b}$$

$$\tan(3a - 2b)$$

D. Paulson

### Sum and Difference Identities

$$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$$

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha\tan\beta}$$

D. Paulson

Given the following ratios use the addition/subtraction formulas to evaluate the problems.

$$\sin 25^\circ = 0.423 \quad \cos 25^\circ = 0.906 \quad \sin 42^\circ = 0.669 \quad \cos 42^\circ = 0.743$$

$$\begin{aligned} \text{Find: } \sin 67^\circ &= \sin(25^\circ + 42^\circ) \\ &= \sin 25^\circ \cos 42^\circ + \cos 25^\circ \sin 42^\circ \\ &= (0.423)(0.743) + (0.906)(0.669) \\ &= 0.920 \end{aligned}$$

#### Sum and Difference Identities

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$$\begin{aligned} \text{Find: } \cos 17^\circ &= \cos(42^\circ - 25^\circ) \\ &= \cos 42^\circ \cos 25^\circ + \sin 42^\circ \sin 25^\circ \\ &= (0.743)(0.906) + (0.669)(0.423) \\ &= 0.956 \end{aligned}$$

#### Sum and Difference Identities

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$$\sin 25^\circ = 0.423 \quad \cos 25^\circ = 0.906 \quad \sin 42^\circ = 0.669 \quad \cos 42^\circ = 0.743$$

Find:  $\sin 50^\circ = \sin(25+25)$   
 $= \sin 25 \cos 25 + \cos 25 \sin 25$   
 $= (0.423)(0.906) + (0.906)(0.423)$   
 $= 0.766$

Sum and Difference Identities
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Given the following ratios use the addition/subtraction formulas to evaluate the problems.

$$\tan x = 0.201 \quad \tan y = 0.459$$

Find:  $\tan(y - x) = \frac{\tan y - \tan x}{1 + \tan y \tan x}$   
 $= \frac{(0.459 - 0.201)}{(1 + 0.459(0.201))} = 0.236$

Sum and Difference Identities
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Use the sum and difference formulas to simplify the expression:

$$\cos(x + y) - \cos(x - y)$$

$$(\cos x \cos y - \sin x \sin y) - (\cos x \cos y + \sin x \sin y)$$

$$\cancel{\cos x \cos y} - \sin x \sin y - \cancel{\cos x \cos y} - \sin x \sin y$$

$$-2 \sin x \sin y$$

### Sum and Difference Identities

$$\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$$

$$\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \tan \beta}$$

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