Sum and Difference Identities 6.3

Overview of problems

🚩 *Example Set: A*

Use the sum and difference identities to determine the exact value of each of the following expressions.

1. $\cos\left(\dfrac{\pi}{4} + \dfrac{\pi}{3}\right)$

2. $\sin\left(\dfrac{\pi}{6} + \dfrac{3\pi}{4}\right)$

3. $\tan\left(\dfrac{4\pi}{3} + \dfrac{5\pi}{4}\right)$

4. $\tan(75°)$

5. $\sin(165°)$

6. $\sin\left(\dfrac{\pi}{12}\right)$

7. $\tan\left(\dfrac{5\pi}{12}\right)$

Sum and Difference Identities 6.3

Overview of problems

🚩 *Example Set: B*

Find the sum or difference for each question.

1. $\sin(A) = \frac{4}{5}$ and $\sin(B) = \frac{5}{13}$ angle A and B are in quadrant I, Find $\cos(A - B)$

2. $\cos(A) = -\frac{15}{17}$

   $\cos(B) = -\frac{3}{5}$ angle A is in quad II, and angle B is quad III, Find $\sin(A + B)$

Use the sum and difference identities to determine the exact value of each of the following expressions.

3. $\dfrac{\tan\left(\frac{5\pi}{16}\right) - \tan\left(\frac{\pi}{16}\right)}{1 + \tan\left(\frac{5\pi}{16}\right)\tan\left(\frac{\pi}{16}\right)}$

4. $\dfrac{\tan(70°) - \tan(10°)}{1 + \tan(70°)\tan(10°)}$

🚩 *Example Set: C*

Use the sum and difference identities to verify the following identities.

1. $\sin\left(\frac{\pi}{2} - x\right)\cos(-x) = \cos^2 x$

2. $\tan(\pi + 2\pi) = 0$

Sum and Difference Identities 6.3

Overview of problems

🚩 *Example Set: A -***ANSWER KEY***

Use the sum and difference identities to determine the exact value of each of the following expressions.

1. $\cos\left(\dfrac{\pi}{4} + \dfrac{\pi}{3}\right) = \dfrac{-\sqrt{6}+\sqrt{2}}{4}$

2. $\sin\left(\dfrac{\pi}{6} + \dfrac{3\pi}{4}\right) = \dfrac{\sqrt{6}-\sqrt{2}}{4}$

3. $\tan\left(\dfrac{4\pi}{3} + \dfrac{5\pi}{4}\right) = -\sqrt{3} - 2$

4. $\tan(75°) = \sqrt{3} + 2$

5. $\sin(165°) = \dfrac{\sqrt{6}-\sqrt{2}}{4}$

6. $\sin\left(\dfrac{\pi}{12}\right) = \dfrac{\sqrt{6}-\sqrt{2}}{4}$

7. $\tan\left(\dfrac{5\pi}{12}\right) = \sqrt{3} + 2$

Sum and Difference Identities 6.3

Overview of problems

🚩 *Example Set: B -**ANSWER KEY***

Find the sum or difference for each question.

1. $\sin(A) = \frac{4}{5}$ and $\sin(B) = \frac{5}{13}$ angle A and B are in quadrant I, Find $\cos(A - B)$

$$\frac{56}{65}$$

2. $\cos(A) = -\frac{15}{17}$

$\cos(B) = -\frac{3}{5}$ angle A is in quad II, and angle B is quad III, Find $\sin(A + B)$

$$\frac{36}{85}$$

Overview of problems

Use the sum and difference identities to determine the exact value of each of the following expressions.

3. $\dfrac{\tan\left(\frac{5\pi}{16}\right) - \tan\left(\frac{\pi}{16}\right)}{1 + \tan\left(\frac{5\pi}{16}\right)\tan\left(\frac{\pi}{16}\right)}$

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

4. $\dfrac{\tan(70°) - \tan(10°)}{1 + \tan(70°)\tan(10°)}$

$$\tan(60°) = \sqrt{3}$$

Overview of problems

🚩   *Example Set: C -**ANSWER KEY***

Use the sum and difference identities to verify the following identities.

1. $\sin\left(\frac{\pi}{2} - x\right)\cos(-x) = \cos^2 x$

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

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

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

$$= 1 \cdot \cos x - 0 \cdot \sin x$$

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

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

$$\cos x \cos(-x) = \cos^2 x$$

$$\cos(-x) = \cos x$$

$$\cos x \cdot \cos x = \cos^2 x$$

$$\cos^2 x = \cos^2 x$$

2. $\tan(\pi + 2\pi) = 0$

$$\tan(\pi + 2\pi) = 0$$

$$\tan(\pi + 2\pi) = \frac{\tan \pi + \tan 2\pi}{1 - \tan \pi \tan 2\pi}$$

$\tan \pi = 0$ $= \dfrac{0 + 0}{1 - 0 \cdot 0}$

$\tan 2\pi = 0$

$$\tan(\pi + 2\pi) = \frac{0}{1}$$

$$\tan(\pi + 2\pi) = 0$$