

Algebra 3 Review Worksheet Assignment # 12

(1) Prove each of the following identities please.

$$(a) \frac{\cos(x)}{\sin(x) - 1} + \frac{\cos(x)}{\sin(x) + 1} = -2 \tan(x)$$

$$(b) \frac{1 + \cos(\theta)}{1 - \cos(\theta)} = 2\csc^2(\theta) + 2\csc(\theta)\cot(\theta) - 1$$

$$(c) \frac{(\csc(\theta) - \cot(\theta))^2 + 1}{\sec(\theta)\csc(\theta) - \cot(\theta)\sec(\theta)} = 2\cot(\theta)$$

$$(d) \frac{\frac{1}{\sin(x)} + 1}{\frac{1}{\sin(x)} - 1} = (\tan(x) + \sec(x))^2$$

$$(e) \frac{2\cot(x)}{1 - \cot^2(x)} + \frac{1}{2\sin^2(x) - 1} = \frac{\sin(x) + \cos(x)}{\sin(x) - \cos(x)}$$

$$(f) \sec^4(x) - \tan^4(x) = \tan^2(x) + \sec^2(x)$$

$$(g) \tan^3(x) = \frac{\sec(x) - \cos(x)}{\csc(x) - \sin(x)}$$

(2) Solve each of the following equations if $0 \leq x < 2\pi$.

$$(a) 2 \sin^2(x) = \cos(x) + 2$$

$$(b) 4 \sin^3(x) + 2 \sin^2(x) - 2 \sin(x) - 1 = 0$$

$$(c) \cos(4x) \cos(2x) = 1 - \sin(4x) \sin(2x)$$

$$(d) \sin(2x) - \sin^2(x) + 2 \sin(x) - \cos(x) - \cos^2(x) = 0$$

$$(e) 2 \sin^2(2x) = 3 \cos^2(x) + \sin^2(x)$$

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Answers

(2) (a) $\left\{ \frac{\pi}{2}, \frac{3\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3} \right\}$

(b) $\left\{ \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \right\}$

(c) $\{0, \pi\}$

(d) $\left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \pi \right\}$

(e) $\left\{ \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \right\}$