

Accelerated Math 3

Topics and Suggested Review Test #3

6. Solve trig eqns. - these review problems are hard - if you need easier problems to review see Section 4.4 of your textbook. p. 173 #21-26
[0, 2π)

$$a) \frac{\cos^3 x}{\sin x} = \cot x$$

$$\cos^2 x \frac{\cos x}{\sin x} = \cot x$$

$$\cos^2 x \cot x - \cot x = 0$$

$$\cot x (\cos^2 x - 1) = 0$$

$$\cot x = 0$$

$$\frac{\cos x}{\sin x} = 0$$

fractions are zero when numerator is 0

$$\therefore \cos x = 0$$

$$x = \arccos(0) = \pm \cos^{-1}(0) + 2\pi n$$

$$\cos^2 x - 1 = 0$$

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

$$\cos x = 1 \quad \text{or} \quad \cos x = -1$$

$$x = \arccos(1) \quad x = \arccos(-1)$$

$$= \pm \cos^{-1}(1) + 2\pi n \quad x = \pm \cos^{-1}(-1) + 2\pi n$$

$$\Downarrow$$
$$2\pi$$

$$\Downarrow$$
$$\pi$$

Six equations yields these 3 answers

$$\underline{x = \frac{\pi}{2}, \frac{3\pi}{2}, \pi, 2\pi}$$

don't include 2π because domain stops there

$$[0, 2\pi) \leftarrow$$

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$$6(b) \quad 2\sin^2 x + \sin x = 1$$

$$2\sin^2 x + \sin x - 1 = 0$$

$$(2\sin x - 1)(\sin x + 1) = 0 \quad \text{factor by trial \& error}$$

$$2\sin x - 1 = 0$$

$$\sin x + 1 = 0$$

$$2\sin x = 1$$

$$\sin x = -1$$

$$\sin x = \frac{1}{2}$$

can answer these

w/ out arcsin because

we know unit circle!

$$\sin x = \frac{1}{2} \quad @ \quad x = \frac{\pi}{6}, \frac{5\pi}{6}$$

$$\sin x = -1 \quad @ \quad x = \frac{3\pi}{2}$$

$$\underline{\underline{x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}}}$$

$$6(c) \quad 2\cos x \sin x - \cos x = 0$$

$$\cos x(2\sin x - 1) = 0$$

$$\cos x = 0$$

or

$$2\sin x - 1 = 0$$

again use
knowledge of
unit circle

$$x = \frac{\pi}{2} + \pi n$$

$$\Rightarrow \frac{\pi}{2}, \frac{3\pi}{2}$$

$$2\sin x = 1$$

$$\sin x = \frac{1}{2}$$

same as 6(b)

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

$$\underline{\underline{x = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{3\pi}{2}}}$$

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$$6(d) \quad \sqrt{2} \tan x \cos x - \tan x = 0$$

$$\tan x (\sqrt{2} \cos x - 1) = 0$$

$$\tan x = 0 \quad \sqrt{2} \cos x - 1 = 0$$

$$\cos x = \frac{1}{\sqrt{2}}$$

$$x = 0, \pi, \dots$$

$$x = \frac{\pi}{4}, \frac{7\pi}{4}$$

$$\underline{\underline{x = 0, \frac{\pi}{4}, \pi, \frac{7\pi}{4}}}$$

$$6(e) \quad \tan x \sin^2 x = \tan x$$

$$\tan x \sin^2 x - \tan x$$

$$\tan x (\sin^2 x - 1) = 0$$

$$\tan x = 0$$

$$\sin^2 x - 1 = 0$$

$$\sin x - 1 = 0 \quad \sin x + 1 = 0$$

$$\sin x = 1 \quad \text{or} \quad \sin x = -1$$

$$x = 0, \pi, \dots$$

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

$$x = \frac{3\pi}{2}$$

$$\underline{\underline{x = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}}}$$

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Topics and Suggested Review - Test #3

$$6(f) \quad \tan^2 x = 3$$

$$\sqrt{\tan^2 x} = \pm \sqrt{3}$$

$$\tan x = \pm \sqrt{3}$$

using knowledge of
unit circle (or arctan)
relations:

$$x = \arctan \sqrt{3} \quad \text{or} \quad x = \arctan^{-\sqrt{3}}$$

$$\Rightarrow x = \frac{\pi}{3}, \frac{4\pi}{3}$$

$$\text{or} \quad x = \frac{2\pi}{3}, \frac{5\pi}{3}$$

$$\underline{\underline{x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}}}}$$

$$6(g) \quad 2\sin^2 x + 3\sin x + 1 \geq 0$$

$$(2\sin x + 1)(\sin x + 1) = 0$$

$$2\sin x + 1 = 0$$

$$\sin x = -\frac{1}{2}$$

$$\sin x + 1 = 0$$

$$\sin x = -1$$

again use

arcsin or

use knowledge

of unit circle...

$$x = \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$x = \frac{3\pi}{2}$$

$$\underline{\underline{x = \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}}}}$$