

Extra credit

1) Verify the identity

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

$$a^2 - b^2 = (a+b)(a-b)$$

Similarly

LHS

$$\Rightarrow (\sin^2(u) + \cos^2(u)) [\sin^2(u) - \cos^2(u)]$$

$$\Rightarrow 1 [\sin^2(u) - \cos^2(u)]$$

$$\Rightarrow \sin^2(u) - (1 - \sin^2(u))$$

$$= 2 \sin^2(u) - 1$$

$$= -1 \times [-2 \sin^2(u) + 1]$$

$$= -1 \times \cos(2x)$$

$$= \text{RHS}$$

$$\Rightarrow \text{LHS} = \text{RHS}$$

$$\because \sin^2 x + \cos^2 x = 1$$

$$\therefore \cos 2x = 1 - 2 \sin^2 x$$

2) Find the exact solution in the interval $[0, 2\pi)$

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

Ans We are seeking solution in interval $[0, 2\pi)$

$$\text{As } \sin(2x) - \cos(x) = 0,$$

we have,

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

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

$$\text{i.e., either } \cos x = 0 \text{ or } \sin x = \frac{1}{2}$$

$$\text{hence, } x = \frac{\pi}{2}, \frac{3\pi}{2} \text{ and } \frac{\pi}{6}$$

3) IF you buy a baseball and a baseball bat for \$1.05 and if the baseball bat is 5 cents more than the baseball, then how much did each one cost?

Ans Let x be the cost of the baseball

And $x + 0.05$ be the cost of the baseball bat

Then,

$$x + x + 0.05 = 1.05$$

$$2x = 1.05 - 0.05$$

$$x = \frac{1}{2} = 0.5$$

$\therefore$ cost of baseball $x = 0.50$ cents

$\therefore$ cost of baseball bat $x + 0.05 = 0.55$ cents