C12 - 4.6 - Equations Algebra Notes

$sinx + sinx = 2sinx$

$5cosx - 3cosx = 2cosx$

Add/Subtract Like Terms

$3tanx = 5 + tanx$
$3m = 5 + m$
$2m = 5$
$m = 2.5$
$tanx = 2.5$

$let\ m = tanx$

....

$1 + sinx = 4sinx$
$1 + m = 4m$
$3m = 1$
$m = \frac{1}{3}$
$sinx = \frac{1}{3}$

$let\ m = sinx$

$Algebra$

.....

$\frac{cosx}{cosx + 1} = -\frac{1}{3}$
$\frac{m}{m + 1} = -\frac{1}{3}$
$3m = -m - 1$
$m = -\frac{1}{4}$
$cosx = -\frac{1}{4}$

$m = cosx$

$2sinx = 4$
$sinx = 2$

No Solution

$sinx = cosx$
$\frac{sinx}{cosx} = 1$
$tanx = 1$
...
$x = \frac{\pi}{4}, \frac{5\pi}{4}$

Identities

$5 - 2cscx = 0$
$5 - 2 \times \frac{1}{sinx} = 0$
$5 - \frac{2}{m} = 0$
$5 = \frac{2}{m}$
$m = \frac{2}{5}$

$csc\theta = \frac{1}{sin\theta}$

$let\ m = sinx$

$m = 0.4$
$sinx = 0.4$

....

$sinx - cscx = 0$
$sinx - \frac{1}{sinx} = 0$
$m - \frac{1}{m} = 0$
$\left(m - \frac{1}{m} = 0\right) \times m$
$m^2 - 1 = 0$
$(m + 1)(m - 1) = 0$

Identities

$let\ m = sinx$

$Factor$

$m = 1$
$sinx = 1$

....

$m = -1$
$sinx = -1$

....

$sinx \neq 0$

C12 - 4.6 - Factoring/Distributing Notes

$cosx(cosx + 1)$

$\cos^2 x + cosx$ *Distribution*

$m(m + 1)$
$m^2 + m$

$\sin x - \sin^2 x$

$sinx(1 - sinx)$ *Factor*

$\sin x - \sin^2 x$
$m - m^2$
$m(1 - m)$
$m = sinx$
$sinx(1 - sinx)$

$sinxcosx + cosx$

$cosx(sinx + 1)$

$nm + m$ $\quad n = sinx$
$m(n + 1)$ $\quad m = cosx$

$(cosx + 1)(cosx - 2)$

$\cos^2 x - cosx - 2$

$(m + 1)(m - 2)$
$m^2 - m - 2$

$(1 + cosx)(1 - cosx)$
$1 - cosx + cosx - \cos^2 x$
$1 - \cos^2 x$ *Distribution*

$(m + n)(m - n)$
$m^2 - n^2$

$1 - \sin^2 x$

$(1 + sinx)(1 - sinx)$

$1 - a^2$
$(1 - a)(1 + a)$

$\cos^2 x - 1$

$(cosx + 1)(cosx - 1)$

$a^2 - 1$
$(a + 1)(a - 1)$

Differences of squares

$\sin^2 x - \cos^2 x$

$(sinx + cosx)(sinx - cosx)$

$m^2 - n^2$
$(m + n)(m - n)$

$\cos^4 x - \sin^4 x$
$(\cos^2 x - \sin^2 x)(\cos^2 x + \sin^2 x)$
$(cos2x)(1)$
$cos2x$

$m^4 - n^4$
$(m^2 + n^2)(m^2 - n^2)$

Identities

$\sin^2 \theta + \cos^2 \theta = 1$
$cos2\theta = \cos^2 \theta - \sin^2 \theta$

$\sin^2 x + sinx - 2$

$(sinx + 2)(sinx - 1)$ *Factor*

$\sin^2 x + sinx - 2$
$m^2 + m - 2$
$(m + 2)(m - 1)$
let $m = sinx$
$(sinx + 2)(sinx - 1)$

$\sin^2 \theta + 2sin\theta cos\theta + \cos^2 \theta$
$(sin\theta + cos\theta)(sin\theta + cos\theta)$

$(cosx + sinx)^2$

$m^2 + 2mn + n^2$
$(m + n)(m + n)$

$-sinx + 1 = 1 - sinx$

$2 + sinx + \sin^2 x = \sin^2 x + sinx + 2$

Rearange order of Terms

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

C12 - 4.6 - Solving Equations Notes

$\cos^2 x + cosx = 0$

$cosx(cosx + 1) = 0$ *Factor*

$cosx = 0$

....

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

$cosx + 1 = 0$

$cosx = -1$

....

$x = \pi$

$\cos^2 x + \cos x = 0$

let $m = cosx$

$m^2 + m = 0$

$m(m + 1) = 0$

Factor

$m = 0$

$cosx = 0$

...

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

$m = -1$

$cosx = -1$

...

$x = \pi$

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

let $m = sinx$

$m^2 + m - 2 = 0$

$(m + 2)(m - 1) = 0$

$m = -2$

$sinx = -2$

Reject

$m = 1$

$sinx = 1$

..

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

$-1 \leq sinx \leq 1$

$-1 \leq cosx \leq 1$

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

let $m = sinx$

$2m^2 + m - 1 = 0$

...

$(2m - 1)(m + 1) = 0$ *Factor*

$m = \frac{1}{2}$

$sinx = \frac{1}{2}$

....

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

...

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

$m = -1$

$sinx = -1$

$3cos^2 x - 8cosx - 5 = 0$

let $m = cosx$

$3m^2 - 8m - 5 = 0$

...

$m = 3.18$

$m = -.52$

Quadform

$cosx = -.52$

...

$x = 2.12$ $x = 4.16$

C12 - 4.6 - Identities Chapter 6 Notes

$$sin2x + cosx = 0$$
$$2sinxcosx + cosx = 0$$
$$cosx(2sinx - 1) = 0$$

Identities

$$sin2\theta = 2sin\theta cos\theta$$

$cosx = 0$

$2sinx - 1 = 0$

$$sinx = \frac{1}{2}$$

.....

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

Identities

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

$$sinx + cos2x = 0$$
$$sinx - (1 - 2\sin^2 x) = 0$$
$$2\sin^2 x + sinx - 1 = 0$$

....

Identities

$$cos2x = 1 - 2\sin^2 x$$

$$\frac{cosx}{cosx + 1} = -\frac{1}{3}$$
$$\frac{m}{m+1} = -\frac{1}{3}$$
$$3m = -m - 1$$
$$m = -\frac{1}{4}$$
$$cosx = -\frac{1}{4}$$

$$1 + cosx = sinx$$
$$(1 + cosx)^2 = (sinx)^2$$
$$1 + 2cosx + \cos^2 x = \sin^2 x$$
$$1 + 2cosx + \cos^2 x = 1 - \cos^2 x$$
$$2\cos^2 x + 2cosx = 0$$
$$2cosx(cosx + 1) = 0$$

$cosx = 0$

....

$cosx = -1$

....

$$cosxcos2x - sinxsin2x = -1$$
$$cosxcos2x - sinxsin2x = -1$$
$$\cos(2x + x) = -1$$
$$cos3x = 1$$

....

$$\cos(\alpha + \beta) = cos\alpha cos\beta - sin\alpha sin\beta$$

Identities