Section 1.4

Dr. ABDALLA

#50) $(2-x)^2 + (2-x) - 20 = 0$

let $z = 2-x$

$z^2 + z - 20 = 0$

$(z-4)(z+5) = 0$

$z-4=0$	$z+5=0$
$z=4$	$z=-5$

$z=4 \Rightarrow 2-x=4 \Rightarrow x=-2$

$z=-5 \Rightarrow 2-x=-5 \Rightarrow x=7$

Sol. Set $x = \{-2, 7\}$

#55) $x + \sqrt{x} = 20$

$\sqrt{x} = 20 - x$

$x = (20-x)^2 = 400 - 40x + x^2$

$\Rightarrow x^2 - 41x + 400 = 0$

$(x-25)(x-16) = 0$

$x-25=0$	$x-16=0$
$x=25$	$x=16$

Check x 25 ; $25 + \sqrt{25} \stackrel{?}{=} 20$

$25 + 5 \neq 20$ ✗ $x=25$ Not Accepted

Check $x=16$; $16 + \sqrt{16} \stackrel{?}{=} 20$

$16 + 4 = 20$, $x=16$ Is Accepted

∴ Sol. Set $x = \{16\}$

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#60) $x^{1/2} - 3x^{1/4} + 2 = 0$

let $z = x^{1/4}$, $z^2 = x^{1/2}$

$\Rightarrow z^2 - 3z + 2 = 0$

$(z-2)(z-1) = 0$

$z-2=0$ | $z-1=0$

$z=2$ | $z=1$

$z=2 \Rightarrow x^{1/4} = 2 \Rightarrow x = 2^4 = 16$, $x=16$

$z=1 \Rightarrow x^{1/4} = 1 \Rightarrow x = 1^4 = 1$; $x=1$

Check: $x=16$; $16^{1/2} - 3\cdot 16^{1/4} + 2 \stackrel{?}{=} 0$

$4 - 3\times 2 + 2 = 0$

$0 = 0$; $x=16$ is Accepted.

Check $x=1$; $1^{1/2} - 3\cdot 1^{1/4} + 2 \stackrel{?}{=} 0$

$1 - 3 + 2 = 0$

$0 = 0$; $x=1$ Is Accepted

$\therefore$ Sol. Set $= \{1, 16\}$

#65) $\dfrac{1}{(x+1)^2} = \dfrac{1}{(x+1)} + 2$

$x+1 \neq 0 \Rightarrow x \neq -1$; 'Cause we can not divide by zero.

Multiply each side of the equation by $(x+1)^2$

$\Rightarrow 1 = (x+1) + 2(x+1)^2$

$1 = x+1+2\cdot(x^2+2x+1)$

Continue #(65) Dr. ABDALWI

$1 = x+1+2(x^2+2x+1)$

$1 = x+1+2x^2+4x+2$

$2x^2+5x+2=0$

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

$2x+1=0$	$x+2=0$
$2x=-1$	$x=-2$
$x=-1/2$	

Sol Set $x=\{-1/2, -2\}$

#70) $3x^{4/3}+5x^{2/3}-2=0$

let $z=x^{2/3} \Rightarrow z^2=x^{4/3}$

$3z^2+5z-2=0$

$(3z-1)(z+2)=0$

$3z-1=0$	$z+2=0$
$3z=1$	$z=-2$
$z=1/3$	

$z=1/3 \Rightarrow x^{2/3}=1/3 \Rightarrow x=(1/3)^{3/2}=\pm\sqrt{\frac{1}{27}}$

$x=\pm\frac{1}{3\sqrt{3}}=\pm\frac{1}{3\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\pm\frac{\sqrt{3}}{9}$

$z=-2 \Rightarrow x^{2/3}=-2 \Rightarrow x=(-2)^{3/2}$

$x=\pm\sqrt{(-2)^3}=\pm\sqrt{-8}$

$=\pm 2\sqrt{2}\,i$

The Real Solutions are $x=\{\pm\frac{\sqrt{3}}{9}\}$

However, we still have to check them in the

#70) Continue original equation

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Check $x = \frac{\sqrt{3}}{9} = \frac{1}{3\sqrt{3}} = \frac{1}{3^{3/2}}$

$3\left(\frac{\sqrt{3}}{9}\right)^{4/3} + 5\left(\frac{\sqrt{3}}{9}\right)^{2/3} - 2 \stackrel{?}{=} 0$, Recall that $\frac{\sqrt{3}}{9} = \frac{1}{3^{3/2}}$

$3\left(\frac{1}{3^{3/2}}\right)^{4/3} + 5\left(\frac{1}{3^{3/2}}\right)^{2/3} - 2 \stackrel{?}{=} 0$

$3 \cdot \frac{1}{9} + 5 \cdot \frac{1}{3} - 2 \stackrel{?}{=} 0$

$\frac{1}{3} + \frac{5}{3} - 2 = 0$

$\frac{6}{3} - 2 = 0$ ✓ Check $\Rightarrow x = \frac{\sqrt{3}}{9}$ Accepted

Check $x = -\frac{\sqrt{3}}{9} = -\left(\frac{1}{3^{3/2}}\right)$

$3\left(\frac{-1}{3^{3/2}}\right)^{4/3} + 5\left(\frac{-1}{3^{3/2}}\right)^{2/3} - 2 \stackrel{?}{=} 0$

$3\left(\frac{1}{9}\right) + 5\left(\frac{1}{3}\right) - 2 \stackrel{?}{=} 0$

$\frac{1}{3} + \frac{5}{3} - 2 = 6$

$\frac{6}{3} \quad 2 \quad = 0$

$2 - 2 = 0$ ✓ $\Rightarrow x = -\frac{\sqrt{3}}{9}$ Accepted

$\therefore$ Sol. Set $x = \left\{ \pm \frac{\sqrt{3}}{9} \right\}$.

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#75) Find the real solutions of each equation by factoring.

$$4x^3 = 3x^2$$

$$\Rightarrow 4x^3 - 3x^2 = 0$$

$$x^2(4x-3) = 0$$

$x^2 = 0$	$4x - 3 = 0$
$x = 0$	$4x = 3 \Rightarrow x = 3/4$

Sol. Set $x = \{0, 3/4\}$

Note that $x=0$ is a repeated root.

#80) $x^3 + 4x^2 - x - 4 = 0$

$$x^2(x+4) - (x+4) = 0$$

$$(x+4)(x^2-1) = 0$$

$x+4 = 0$	$x^2 - 1 = 0$
$x = -4$	$x^2 = 1 \Rightarrow x = \pm 1$

$\therefore$ Sol. Set $x = \{\pm 1, -4\}$.