

Practice Problems

1.) $w^4 - 15w^2 - 16 = 0$ Let $X = w^2$

$\Rightarrow X^2 - 15X - 16 = 0$

$\Rightarrow (X - 16)(X + 1) = 0$

$\Rightarrow X = 16$ or $X = -1$

Sub back

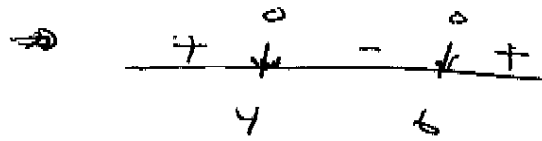
$\Rightarrow w^2 = 16$ or $w^2 = -1$

$\Rightarrow w = \pm 4$ or $w = \pm i$

2.) $x^2 - 10x + 24 < -24$

$\Rightarrow X^2 - 10X + 24 < 0$

$\Rightarrow (X - 6)(X - 4) < 0$



Sign diagram.

$4 < x < 6$

Also $(4, 6)$

3.) $\sqrt{x+10} - \sqrt{x+5} = 1$

$\Rightarrow \sqrt{x+10} = 1 + \sqrt{x+5}$

$\Rightarrow x+10 = (1 + \sqrt{x+5})^2$

$\Rightarrow x+10 = 1 + 2\sqrt{x+5} + (x+5)$

$\Rightarrow 4 = 2\sqrt{x+5}$

$\Rightarrow 2 = \sqrt{x+5}$

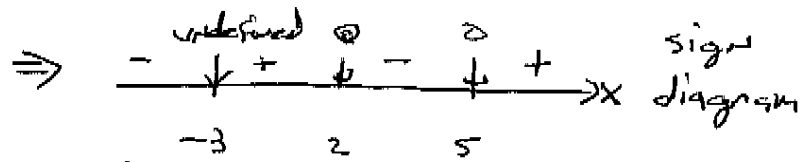
$\Rightarrow 4 = x+5$

$\Rightarrow x = -1$

check \checkmark

4.) $\frac{x^2 - 7x + 10}{x+3} \geq 0$

$\Rightarrow \frac{(x-5)(x-2)}{x+3} \geq 0$



Sign diagram

$-3 < x \leq 2$ or $5 \leq x$

$(-3, 2] \cup [5, \infty)$

5.) $x+2 = \sqrt[3]{12x+8}$

$\Rightarrow (x+2)^3 = 12x+8$

$\Rightarrow x^3 + \cancel{6}x^2 + \cancel{12}x + \cancel{8} = 12x+8$

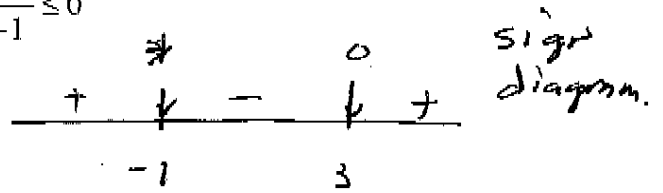
$\Rightarrow \cancel{x^3} + 2x^2 + \cancel{8x} = 0 \Rightarrow x^3 + 6x^2 = 0 \quad -1 < x \leq 3$

$\Rightarrow \cancel{x(x^2 + 2x - 8)} = 0 \Rightarrow x^2(x+6) = 0$

$\Rightarrow \cancel{x(x+4)(x-2)} = 0 \Rightarrow x=0 \text{ or } x=-6$ Also $(-1, 3]$

$\Rightarrow \cancel{x=0 \text{ or } x=4 \text{ or } x=2}$

6.) $\frac{3x-9}{x+1} \leq 0$



7.) $x+1 = \sqrt{x+3}$

$\Rightarrow (x+1)^2 = x+3$

$\Rightarrow x^2 + 2x + 1 = x + 3$

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

$\Rightarrow (x+2)(x-1) = 0$

$\Rightarrow x = -2 \text{ or } x = 1$

check

$\boxed{x=1} \quad \boxed{x=-2}$
 9.) $t^2 - t^2 - 42 = 0$

$\Rightarrow (\frac{1}{t})^2 - (\frac{1}{t}) - 42 = 0$

$\Rightarrow w^2 - w - 42 = 0$

$\Rightarrow (w-7)(w+6) = 0$

$\Rightarrow w = 7 \text{ or } w = -6$

sub back

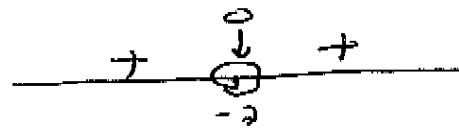
$\Rightarrow \frac{1}{t} = 7 \text{ or } \frac{1}{t} = -6$

$\Rightarrow t = \frac{1}{7} \text{ or } t = -\frac{1}{6}$

8.) $x^2 + 14x > -49$

$\Rightarrow x^2 + 14x + 49 > 0$

$\Rightarrow (x+7)^2 > 0$



$x < -7 \text{ or } x > -7$

Also $(-\infty, -7) \cup (-7, \infty)$

9.) $\omega = \frac{1}{t}$

(10.) $x^3 - 5x^2 - 9x + 45 = 0$

$\Rightarrow (x^3 - 5x^2) - (9x - 45) = 0$

$\Rightarrow x^2(x-5) - 9(x-5) = 0$

$\Rightarrow (x^2 - 9)(x-5) = 0$

$\Rightarrow (x+3)(x-3)(x-5) = 0$

$\Rightarrow x = \pm 3 \text{ or } x = 5$