ALGEBRA 2

Solving Harder Algebraic Equations

Problems

2) $x^4 - 17x^2 + 16 = 0$

3) $x^4 - 25x^2 + 144 = 0$

4) $x^4 - 13x^2 + 36 = 0$

5) $4x^4 - 101x^2 + 25 = 0$

6) $25x^4 - 32x^2 + 7 = 0$

7) $x^8 + 8x^4 - 9 = 0$

8) $x^8 - 18x^4 + 81 = 0$

9) $9x^4 - 61x^2 - 100 = 0$

10) $3x^4 + 112x^2 - 144 = 0$

11) $6x^8 + 58x^4 - 64 = 0$

12) $4x^4 - 37x^2 + 9 = 0$

13) $x^2 + 9x - 36 = 0$

14) $4x^2 + 6x - 70 = 0$

15) $x^4 + 6x^2 - 40 = 0$

16) $\frac{5}{x} + \frac{x+5}{5} = \frac{39}{5x}$

SOLUTIONS

1) $x^4 - 17x^2 + 16 = 0$

$(x^2 - 1)(x^2 - 16) = 0$

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

$x - 1 = 0 \quad x + 1 = 0 \quad x - 4 = 0 \quad x + 4 = 0$

$x = 1 \quad , x = -1 \quad , x = 4 \quad , x = -4$

2) $x^4 - 25x^2 + 144 = 0$

$(x^2 - 9)(x^2 - 16) = 0$

$(x-3)(x+3)(x-4)(x+4) = 0$

$x - 3 = 0 \quad x + 3 = 0 \quad x - 4 = 0 \quad x + 4 = 0$

$x = 3 \quad , x = -3 \quad , x = 4 \quad , x = -4$

3) $x^4 - 13x^2 + 36 = 0$

$(x^2 - 4)(x^2 - 9) = 0$

$(x-2)(x+2)(x-3)(x+3) = 0$

$x - 2 = 0 \quad x + 2 = 0 \quad x - 3 = 0 \quad x + 3 = 0$

$x = 2 \quad x = -2 \quad x = 3 \quad x = -3$

4) $4x^4 - 101x^2 + 25 = 0$

$(4x^2 - 1)(x^2 - 25) = 0$

$(2x-1)(2x+1)(x-5)(x+5) = 0$

$2x - 1 = 0 \quad 2x + 1 = 0$

$2x = 1 \quad 2x = -1 \quad x - 5 = 0 \quad x + 5 = 0$

$x = ½ \quad , x = -½ \quad , x = 5 \quad , x = -5$

5) $25x^4 - 32x^2 + 7 = 0$

$(25t^2-7)(t^2-1)=0$

$(25t^2-7)(t-1)(t+1)=0$

$25t^2-7=0$

$25t^2=7$

$t^2=7/25$

$t=\dfrac{\sqrt{7}}{5}$ $t-1=0$ $t+1=0$

$t=1$ $t=-1$

6) $x^8+8x^4-9=0$

$(x^4-1)(x^4+9)=0$

$(x^2-1)(x^2+1)(x^4+9)=0$

$x^2-1=0$ $x^2+1=0$ $x^4+9=0$

$x^2=1$ $x^2=-1$ $x^4=-9$

$x=\pm1$, $x=\pm i$, $x=\pm i\sqrt[4]{9}$

7) $x^8-18x^4+81=0$

$(x^4-9)(x^4-9)=0$

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

$x^2-3=0$ $x^2+3=0$

$x^2=3$ $x^2=-3$

$x=\pm\sqrt{3}$, $x=\pm i\sqrt{3}$

8) $9x^4-61x^2-100=0$

$(9x^2-25)(x^2-4)=0$

$(3x-5)(3x+5)(x-2)(x+2)=0$

$3x-5=0$ $3x+5=0$

$3x=5$ $3x=-5$

$x=\dfrac{5}{3}$, $x=-\dfrac{5}{3}$, $x-2=0$ $x+2=0$

$x=2$, $x=-2$

9) $3x^4+112x^2-144=0$

$(3x^2+4)(x^2-36)=0$

$(3x^2+4)(x-6)(x+6)=0$

$3x^2+4=0$

$3x^2=-4$

$x^2=-4/3$

$x=\pm i\sqrt{\dfrac{4}{3}}$ $x-6=0$ $x+6=0$

, $x=6$, $x=-6$

10) $6x^8+58x^4-64=0$

$(6x^4+64)(x^4-1)=0$

$2(3x^4+32)(x^2-1)(x^2+1)=0$

$3x^4+32=0$

$3x^4=-32$

$x^4=-\dfrac{32}{3}$ $x^2-1=0$ $x^2+1=0$

$x^2=1$ $x^2=-1$

$x=\pm i\sqrt[4]{32/3}$, $x=\pm1$, $x=\pm i$

11) $4x^4-37x^2+9=0$

$(4x^2-1)(x^2-9)=0$

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

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

$2x=1$ $2x=-1$ $x-3=0$

$x=1/2$, $x=-1/2$, $x=3$

12) $x^2 + 9x - 36 = 0$

$(x+12)(x-3) = 0$

$x+12 = 0 \quad x-3 = 0$

$x = -12 \quad x = 3$

13) $4x^2 + 6x - 70 = 0$

$(2x+10)(2x-7) = 0$

$2x-7 = 0$

$2x+10 = 0 \quad 2x = 7$

$2x = -10 \quad x = \frac{7}{2}$

$x = -5$,

14) $x^4 + 6x^2 - 40 = 0$

$(x^2+10)(x^2-4) = 0$

$x^2+10 = 0 \quad x^2-4 = 0$

$x^2 = -10 \quad x^2 = 4$

$x = \pm i\sqrt{10}$, $x = \pm 2$

15) $\frac{5}{x} + \frac{x+5}{5} = \frac{39}{5x}$

$25 + x^2 + 5x = 39$

$x^2 + 5x - 14 = 0$

$(x+7)(x-2) = 0$

$x+7 = 0 \quad x-2 = 0$

$x = -7$, $x = 2$