Перемножалка

1) $(x^2 - 3x)(x - 1)(x - 2) = 24$

2) $(x^2 - 5x)(x + 3)(x - 8) + 108 = 0$

3) $(x + 4)^2(x + 10)(x - 2) + 243 = 0$

4) $x(x + 3)(x + 5)(x + 8) + 56 = 0$

5) $(x - 3)(x - 4)(x - 5)(x - 6) = 1680$

6) $(x - 2)(x - 3)^2(x - 4) = 20$

7) $(x - 4)(x - 3)(x - 2)(x - 1) = 24$

$(x - 3)(x - 4)(x - 5)(x - 6) = 1680;$
$(x^2-9x+20)(x^2-9x+18)=1680;$
$y=x^2-9x;$
$(y+20)(y+18)=1680;$
$y^2+38y+360-1680=0;$
$y^2+38y-1320=0;$
$D^*=19^2+1320=361+1320=1681; D^*>0; VD^*=41$
$y1=-19-41=-60;$
$y1=-19+41=22;$

$X^2-9x+60=0$
$D=81-240=-159; D<0$
no solutions

$X^2-9x-22=0$
$x1=11$
$x2=-2$

Answer: 11; -2

$(x - 2)(x - 3)^2(x - 4) = 20$
$(x-2)(x-3)(x-3)(x-4)=20$
$(x^2-6x+9)(x^2-6x+8)=20$
$y=x^2-6x$
$(y+9)(y+8)=20$
$y^2+17y+52=0$
$y1=-13$
$y2=-4$

$x^2-6x+13=0$
$D^*=9-13=-4; D^*<0$
no solutions

$x^2-6x+4=0$
$D^*=9-4=5; D^*>0;$
$x1=3-V5$
$x1=3+V5$

Answer: 3+V5;3-V5

$(x^2 - 3x)(x - 1)(x - 2) = 24$

$(x - 1)(x - 2)=x^2-3x+2$
$(x^2 - 3x)(x^2-3x+2) = 24$
$x^2-3x=y$
$y(y+2)=24$
$y^2+2y-24=0$
$y1=-6$
$y2=4$

$x^2-3x=-6$
$x^2-3x=4$

$x^2-3x+6=0$
$D=9-4*6=9-24=-15; D<0$

$x^2-3x-4=0$
$x1=4$
$x2=-1$

Answer: 4;-1

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7) $(x - 4)(x - 3)(x - 2)(x - 1) = 24$

$(x - 4)(x - 3)(x - 2)(x - 1) = 24$
$(x - 4)(x - 1)=x^2-5x+4$
$(x - 3)(x - 2)=x^2-5x+6$
$y=x^2-5x+4$
$y(y+2)=24$
$y^2+2y-24=0$
$y1=-6$
$y2=4$

$x^2-5x+4=-6$
$x^2-5x+10=0$
$D=25-40=-15; D<0$

$x^2-5x+4=4$
$x^2-5x=0$
$x(x-5)=0$
$x1=0$
$x2=5$

Answer: 0;5

$(x^2 - 5x)(x + 3)(x - 8) + 108 = 0$
$(x^2-5x)(x^2-8x+3x-24)=-108$
$(x^2-5x)(x^2-5x-24)+108=0$
$y=x^2-5x$
$y(y-24)+108=0$
$y^2-24y+108=0$
$D^*=(24/2)^2-108=144-108=36; D^*>0; VD^*=6;$
$y1=-b/2-VD^*/a=(12-6)/1=6;$
$y2=(12+6)/1=18;$

$x^2-5x=6$
$x^2-5x-6=0$
$D=25+24=49; D>0; VD=7$
$x1=(5-7)/2=-1$
$x2=(5+7)/2=6$

$x^2-5x=18$
$x^2-5x-18=0$
$D=25+72=97; D>0;$
$x3=(5-V97)/2$
$x4=(5+V97)/2$

Answer: -1;6;(5-V97)/2;(5+V97)/2

$(x + 4)^2(x + 10)(x - 2) + 243 = 0 ;$
$(x^2+8x+16)(x^2+8x-20)+243=0;$
$y=x^2+8x;$
$(y+16)(y-20)+243=0;$
$y^2-4y-320+243=0;$
$y^2-4y-77=0;$
$y1=11;$
$y2=-7;$

$x^2+8x=11$
$x^2+8x-11=0$
$D=64+44=108; D>0;$
$x1=(-8-V108)/2=(-8-V4*3*9)/2=(-8-6V3)/2=-4-3V3$
$x2=(-8+V108)/2=(-8+V4*3*9)/2=(-8+6V3)/2=-4+3V3$

$x^2+8x=-7$
$x^2+8x+7=0$
$x3=-7$
$x4=-1$

Answer: -4-3V3;-4+3V3;-7;-1

$x(x + 3)(x + 5)(x + 8) + 56 = 0$
$(x^2+8x)(x^2+8x+15)+56=0$
$y=x^2+8x$
$y(y+15)+56=0$
$y^2+15y+56=0$
$y1=-7$
$y2=-8$

$x^2+8x=-7$
$x^2+8x+7=0$
$x1=-7$
$x2=-1$

$x^2+8x=-8$
$x^2+8x+8=0$
$D=16-8=8; D>0;$
$x3=-4-V8$
$x4=-4+V8$

Answer: -4-V8;-4+V8;-7;-1