B9. Equazioni di grado superiore al secondo - Esercizi

LEGGE DI ANNULLAMENTO DEL PRODOTTO

1) $2x^3+4x^2-4x-8=0$ [x_1=-2, $x_2=\sqrt{2}$, $x_3=-\sqrt{2}$]
2) $a^3-3a^2-3a+9=0$ [a_1=3, $a_2=\sqrt{3}$, $a_3=-\sqrt{3}$]
3) $9a+6a^3+3+2a^2=0$ [$a_1=-\frac{1}{3}$]
4) $x^3+x^2+x+1=0$ [x_1=-1]
5) $2x^3-2x+4x^2-4=0$ [x_1=-2, x_2=-1, x_3=1]
6) $a^3-3a^2+3a-9=0$ [a_1=3]
7) $2a^4-2a-a^3+1=0$ [$a_1=\frac{1}{2}$, a_2=1]
8) $a^4-a^2+a^3-a=0$ [a_1=0, a_2=1, a_3=-1]
9) $-2a^3-2a-2a^2-2=0$ [a_1=-1]
10) $x^3-9x=0$ [x_1=0, x_2=-3, x_3=3]
11) $x^3-4x=0$ [x_1=0, x_2=2, x_3=-2]
12) $25x-x^3=0$ [x_1=0, x_2=5, x_3=-5]
13) $4x-9x^3=0$ [x_1=0, $x_2=\frac{2}{3}$, $x_3=-\frac{2}{3}$]
14) $2x^3-2x=0$ [x_1=0, x_2=-1, x_3=1]
15) $x-x^3=0$ [x_1=0, x_2=-1, x_3=1]
16) $27x-3x^3=0$ [x_1=0, x_2=3, x_3=-3]
17) $x^3-25x=0$ [x_1=0, x_2=5, x_3=-5]
18) $9+4x^4-12x^2=0$ [$x_1=\frac{\sqrt{6}}{2}$, $x_2=-\frac{\sqrt{6}}{2}$]
19) $x^4+1-2x^2=0$ [x_1=1, x_2=-1]
20) $x^4+16+8x^2=0$ [impossibile]
21) $\frac{1}{16}x^4+1-\frac{1}{2}x^2=0$ [x_1=2, x_2=-2]
22) $\frac{1}{16}x^4+1+\frac{1}{4}x^2=0$ [impossibile]
23) $9a+a^3-6a^2=0$ [a_1=0, a_2=3]
24) $4a+25a^3-20a^2=0$ [a_1=0, $a_2=\frac{2}{5}$]
25) $a^3+2a^2+a=0$ [a_1=0, a_2=-1]
26) $12b+75b^3+60b^2=0$ [b_1=0, $b_2=-\frac{2}{5}$]
27) $a^3-2a^2+a=0$ [a_1=0, a_2=1]
28) $x^3+4x^2+4x=0$ [x_1=0, x_2=-2]
29) $18x+24x^2+8x^3=0$ [x_1=0, $x_2=-\frac{3}{2}$]
30) $2a-8a^2+8a^3=0$ [a_1=0, $a_2=\frac{1}{2}$]
31) $\frac{1}{4}b^3+9b-3b^2=0$ [b_1=0, b_2=6]
32) $a^3-3a^2+3a-1=0$ [a_1=1]
33) $8+12x+6x^2+x^3=0$ [x_1=-2]
34) $8a^3-12a^2+6a-1=0$ [$x_1=\frac{1}{2}$]
35) $8a^3+12a^2+6a+1=0$ [$x_1=-\frac{1}{2}$]
36) $a^3-6a^2+12a-8=0$ [a_1=2]
37) $8x^3-36x^2+54x-27=0$ [$x_1=\frac{3}{2}$]
38) $8x^3+12x^2+6x+1=0$ [$x_1=-\frac{1}{2}$]
39) $\frac{1}{8}x^3+\frac{3}{4}x^2+\frac{3}{2}x+1=0$ [x_1=-2]
40) $\frac{1}{27}x^3-\frac{1}{3}x^2+x-1=0$ [x_1=3]

41) $27x^3 - 135x^2 + 225x - 125 = 0$ [$x_1 = \frac{5}{3}$]

42) $8 - 12x + 6x^2 - x^3 = 0$ [$x_1 = 2$]

43) $8x^3 - 18x^2 + 27x - 27 = 0$ [$x_1 = \frac{3}{2}$]

44) $\frac{8}{27}x^3 - 4x^2 + 18x - 27 = 0$ [$x_1 = \frac{9}{2}$]

45) $\frac{8}{27}x^3 + \frac{4}{3}x^2 + 2x + 1 = 0$ [$x_1 = -\frac{3}{2}$]

46) $1 - 2a + \frac{4}{3}a^2 - \frac{8}{27}a^3 = 0$ [$a_1 = \frac{3}{2}$]

47) $\frac{8}{27} - \frac{4}{3}a + 2a^2 - a^3 = 0$ [$a_1 = \frac{3}{2}$]

48) $\frac{1}{8} + \frac{9}{4}a + \frac{27}{2}a^2 + 27a^3 = 0$ [$a_1 = -\frac{1}{6}$]

49) $1 - \frac{9}{4}a + \frac{27}{16}a^2 - \frac{27}{64}a^3 = 0$ [$x_1 = \frac{4}{3}$]

50) $a^3 + 2a^2 - 15a = 0$ [$a_1=0$, $a_2=-5$, $a_3=3$]

51) $a^3 + a^2 - 2a = 0$ [$a_1=0$, $a_2=-2$, $a_3=1$]

52) $a^6 - 2a^4 - 3a^2 = 0$ [$a_1=0$, $a_2=\sqrt{3}$, $a_3=-\sqrt{3}$]

53) $x^4 + 8x^3 + 12x^2 = 0$ [$x_1=0$, $x_2=-2$, $x_3=-6$]

54) $x^3 - 8x^2 + 15x = 0$ [$x_1=0$, $x_2=3$, $x_3=5$]

55) $x^3 - 5x^2 - 6x = 0$ [$x_1=-1$, $x_2=0$, $x_3=6$]

56) $x^3 + 12x^2 - 28x = 0$ [$x_1=0$, $x_2=2$, $x_3=-14$]

57) $x^3 + 15x^2 + 26x = 0$ [$x_1=0$, $x_2=-2$, $x_3=-13$]

58) $x^4 + x^3 - 12x^2 = 0$ [$x_1=0$, $x_2=3$, $x_3=-4$]

59) $x^3 + x^2 - 56x = 0$ [$x_1=0$, $x_2=7$, $x_3=-8$]

60) $3x^4 - 9x^3 - 162x^2 = 0$ [$x_1=0$, $x_2=-6$, $x_3=9$]

61) $4x^3 + 6x^2 + 4x = 0$ [$x_1=0$]

62) $2x^3 - 2x^2 - 84x = 0$ [$x_1=0$, $x_2=-6$, $x_3=7$]

63) $x^3 - 2x^2 - 80x = 0$ [$x_1=0$, $x_2=-8$, $x_3=10$]

64) $x^3 + 2x^2 - 3x = 0$ [$x_1=0$, $x_2=1$, $x_3=-3$]

65) $x^4 + 5x^3 + 6x^2 = 0$ [$x_1=0$, $x_2=-2$, $x_3=-3$]

66) $x^3 + 6x^2 + 11x + 6 = 0$ [$x_1=-1$ $x_2=-2$, $x_3=-3$]

67) $x^3 - 2x^2 - 5x + 6 = 0$ [$x_1=1$, $x_2=-2$, $x_3=3$]

68) $x^3 - 2x^2 - 9x + 18 = 0$ [$x_1=2$, $x_2=-3$, $x_3=3$]

69) $x^3 + 4x^2 - 11x - 30 = 0$ [$x_1=-2$, $x_2=3$, $x_3=-5$]

70) $-x^3 + 4x^2 - x - 6 = 0$ [$x_1=-1$, $x_2=2$, $x_3=3$]

71) $x^3 - 10x^2 + 8x + 64 = 0$ [$x_1=-2$, $x_2=4$, $x_3=8$]

72) $-x^3 - 4x^2 + 7x + 10 = 0$ [$x_1=-1$, $x_2=2$, $x_3=-5$]

73) $-x^3 - 3x^2 + 25x - 21 = 0$ [$x_1=1$, $x_2=3$, $x_3=-7$]

74) $2x^3 - 3x^2 - 3x + 2 = 0$ [$x_1=-1$, $x_2=2$, $x_3=\frac{1}{2}$]

75) $2x^3 + 17x^2 + 5x - 24 = 0$ [$x_1=1$, $x_2=-8$, $x_3=-\frac{3}{2}$]

76) $4x^3 - 13x^2 + 4x + 5 = 0$ [$x_1=1$, $x_2=\frac{9-\sqrt{161}}{8}$, $x_3=\frac{9+\sqrt{161}}{8}$]

77) $9x^3 - 27x^2 + 20x - 4 = 0$ [$x_1=2$, $x_2=\frac{1}{3}$, $x_3=\frac{2}{3}$]

78) $9x^3 - 54x^2 + 41x + 20 = 0$ [$x_1=5$, $x_2=-\frac{1}{3}$, $x_3=\frac{4}{3}$]

79) $9x^3 - 37x + 28 = 0$ [$x_1=1$, $x_2=\frac{4}{3}$, $x_3=-\frac{7}{3}$]

80) $2x^3 + x^2 - 16x - 15 = 0$ [$x_1=-1$, $x_2=3$, $x_3=-\frac{5}{2}$]

81) $2x^3 - 3x^2 - x - 2 = 0$ [$x_1=2$]

82) $x^3 + 2x^2 + 2x + 15 = 0$ [$x_1=-3$]

83) $3x^3 - 2x^2 - 1 = 0$ [$x_1=1$]

84) $4x^3 - 4x^2 + 3x - 1 = 0$ [$x_1=\frac{1}{2}$]

85) $-x^3 + 6x^2 - 14x + 15 = 0$ [$x_1=3$]

86) $x^3 - 5x^2 - 3x - 18 = 0$ [x_1=6]

87) $-3x^3 + 5x^2 - 3x + 5 = 0$ [$x_1=\frac{5}{3}$]

88) $x^4 - 3x^3 - 7x^2 + 15x + 18 = 0$ [x_1=-1, x_2=-2, x_3=3]

89) $2x^4 + 5x^3 - 4x^2 - 3x = 0$ [x_1=0, x_2=1, $x_3=-\frac{1}{2}$, x_4=-3]

90) $x^5 + 3x^4 - x^3 - 3x^2 = 0$ [x_1=0, x_2=1, x_3=-1, x_4=-3]

91) $3x^4 - x^3 - 9x^2 - 3x + 2 = 0$ [x_1=-1, x_2=2, $x_3=\frac{1}{3}$]

92) $2x^4 - 5x^3 - 2x^2 + 4x + 8 = 0$ [x_1=2]

93) $x^4 - 11x^3 + 41x^2 - 61x + 30 = 0$ [x_1=1, x_2=2, x_3=3, x_4=5]

94) $-2x^4 + 11x^3 - 11x^2 - 15x + 9 = 0$ [x_1=-1, x_2=3, $x_3=\frac{1}{2}$]

95) $8x^3 + 3x^2 - 40x - 15 = 0$ [$x_1=-\frac{3}{8}$, $x_2=\sqrt{5}$, x_3=-$\sqrt{5}$]

96) $2x^3 - x - 1 = 0$ [x_1=1]

97) $x^4 - 4x^3 + 16x - 16 = 0$ [x_1=-2, x_2=2]

98) $4x^4 - 2x^3 + 2x - 1 = 0$ [$x_1=\frac{1}{2}$, $x_2=\frac{-\sqrt[3]{4}}{2}$]

99) $x^3 - 7x + 6 = 0$ [x_1=1, x_2=2, x_3=-3]

100) $8x^3 - 8x^2 + 2x = 0$ [x_1=0, $x_2=\frac{1}{2}$]

101) $a^3 + 3a^2 - 4a = 0$ [a_1=0, a_2=-4, a_3=1]

102) $a^4 + 19a^3 - 20a^2 = 0$ [a_1=0, a_2=-20, a_3=1]

103) $2x^3 - 7x^2 + 2x + 3 = 0$ [x_1=1, x_2=3, $x_3=-\frac{1}{2}$]

104) $a^6 - 2a^3 + 1 = 0$ [a_1=1]

105) $x^3 - 5x^2 + 2x + 8 = 0$ [x_1=-1, x_2=2, x_3=4]

106) $y^3 - 2y^2 - 15y = 0$ [y_1=0, y_2=5, y_3=-3]

107) $a^3 + 8a^2 - 20a = 0$ [a_1=0, a_2=-10, a_3=2]

108) $16a^4 - 2a = 0$ [a_1=0, $a_2=\frac{1}{2}$]

109) $x^3 + 6x^2 + 12x + 8 = 0$ [x_1=-2]

110) $x^3 + 3x^2 - 13x - 15 = 0$ [x_1=-1, x_2=3, x_3=-5]

111) $10x^4 - 6x^3 - 4x^2 = 0$ [x_1=0, x_2=1, $x_3=-\frac{2}{5}$]

112) $x^3 + 3x^2 - 4x - 12 = 0$ [x_1=2, x_2=-2, x_3=-3]

113) $2x - 8x^3 = 0$ [x_1=0, $x_2=\frac{1}{2}$, $x_3=-\frac{1}{2}$]

114) $(2x+1)^3 - (2x+1) = 0$ [x_1=0, x_2=-1, $x_3=-\frac{1}{2}$]

115) $(a^2-4) + (a^2-4)^2 = 0$ [a_1=2, a_2=-2, $a_3=\sqrt{3}$, a_4=-$\sqrt{3}$]

116) $a^6 - 12a^4 + 48a^2 - 64 = 0$ [a_1=-2, a_2=2]

117) $a^4 - 2a^2 + 1 = 0$ [a_1=1, a_2=-1]

118) $4a^4 - 16a^2 = 0$ [a_1=0, a_2=2, a_3=-2]

119) $2x^3 - 2x + 4x^2 - 4 = 0$ [x_1=1, x_2=-1, x_3=-2]

120) $2a^4 - 2a - a^3 + 1 = 0$ [a_1=1, $a_2=\frac{1}{2}$]

121) $a^4 - a^2 + a^3 - a = 0$ [a_1=0, a_2=1, a_3=-1]

BINOMIE

122) $x^4 - 9 = 0$ [$x_1=\sqrt{3}$, x_2=-$\sqrt{3}$]

123) $9a^4 - 1 = 0$ [$a_1=\frac{\sqrt{3}}{3}$, a_2=-$\frac{\sqrt{3}}{3}$]

124) $25a^8 - \frac{9}{4} = 0$ [$a_1=\frac{\sqrt[4]{3000}}{10}$, a_2=-$\frac{\sqrt[4]{3000}}{10}$]

125) $2x^4 + 1 = 0$ [impossibile]

126) $2x^4 - 1 = 0$ [$x_1=\frac{\sqrt[4]{8}}{2}$, x_2=-$\frac{\sqrt[4]{8}}{2}$]

127) $x^4 + 16 = 0$ [impossibile]

128) $x^4 - 16 = 0$ [x_1=2, x_2=-2]

129) $a^3 - 1 = 0$ [a_1=1]

130) $a^6 - 1 = 0$ [a_1=1, a_2=-1]

131) $a^6 - 27 = 0$ [$a_1=\sqrt{3}$, $a_2=-\sqrt{3}$]

132) $a^9 + 8 = 0$ [$a_1=-\sqrt[3]{2}$]

133) $8 - b^3 = 0$ [b_1=2]

134) $27 + x^3 = 0$ [x_1=-3]

135) $a^3 + 1 = 0$ [a_1=-1]

136) $8x^3 + 1 = 0$ [$x_1=-\frac{1}{2}$]

137) $27x^3 - 8 = 0$ [$x_1=\frac{2}{3}$]

138) $a^3 + 8 = 0$ [a_1=-2]

139) $a^3 - 8 = 0$ [a_1=2]

140) $b^3 - 27 = 0$ [b_1=3]

141) $b^3 + 27 = 0$ [b_1=-3]

142) $64 - a^6 = 0$ [a_1=-2, a_2=2]

143) $64 + b^6 = 0$ [impossibile]

144) $\frac{8}{27}a^3 - 1 = 0$ [$a_1=\frac{3}{2}$]

145) $\frac{27}{8} + a^3 = 0$ [$a_1=-\frac{3}{2}$]

146) $100 - x^4 = 0$ [$x_1=\sqrt{10}$, $x_2=-\sqrt{10}$]

147) $3a^3$-24=0 [a_1=2]

148) $3a^4 - 3 = 0$ [a_1=1, a_2=-1]

149) x^3+1=0 [x_1=-1]

150) x^3-1=0 [x_1=1]

151) 1-x^3=0 [x_1=1]

152) 8-8x^3=0 [x_1=1]

153) 8-x^3=0 [x_1=2]

154) $x^4 - 9 = 0$ [$x_1=\sqrt{3}$, $x_2=-\sqrt{3}$]

155) $9a^4 - 1 = 0$ [$a_1=\frac{\sqrt{3}}{3}$, $a_2=-\frac{\sqrt{3}}{3}$]

156) $a^6 - 27 = 0$ [$a_1=\sqrt{3}$, $a_2=-\sqrt{3}$]

157) $64 - a^6 = 0$ [a_1=-2, a_2=-2]

TRINOMIE

158) $a^4 - 12a^2 + 11 = 0$ [a_1=1, a_2=-1, $a_3=\sqrt{11}$, $a_4=-\sqrt{11}$]

159) $a^4 - 6a^2 - 7 = 0$ [$a_1=\sqrt{7}$, $a_2=-\sqrt{7}$]

160) $x^4 + 7x^2 - 30 = 0$ [$x_1=\sqrt{3}$, $x_2=-\sqrt{3}$]

161) $x^4 + 7x^2 - 18 = 0$ [$x_1=\sqrt{2}$, $x_2=-\sqrt{2}$]

162) $a^4 - 9a^2 - 36 = 0$ [$a_1=2\sqrt{3}$, $a_2=-2\sqrt{3}$]

163) $a^4 - 15a^2 + 36 = 0$ [$a_1=2\sqrt{3}$, $a_2=-2\sqrt{3}$, $a_3=\sqrt{3}$, $a_4=-\sqrt{3}$]

164) $a^4 + 15a^2 + 36 = 0$ [impossibile]

165) $a^4 + 9a^2 - 36 = 0$ [$a_1=\sqrt{3}$, $a_2=-\sqrt{3}$]

166) $x^4 - 5x^2 + 4 = 0$ [x_1=1, x_2=-1, x_3=2, x_4=-2]

167) $64 + 16a^3 + a^6 = 0$ [a_1=-2]

168) $x^4 + 1 - 2x^2 = 0$ [x_1=1, x_2=-1]

169) $a^6 - 2a^4 - 3a^2 = 0$ [a_1=0, $a_2=\sqrt{3}$, $a_3=-\sqrt{3}$]

170) $x^4 - 10x^2 + 9 = 0$ [x_1=1, x_2=-1, x_3=3, x_4=-3]

171) $x^4 - 13x^2 + 36 = 0$ [x_1=3, x_2=-3, x_3=2, x_4=-2]

172) $x^4 - 26x^2 + 25 = 0$ [x_1=1, x_2=-1, x_3=5, x_4=-5]

173) $x^4 - 20x^2 + 64 = 0$ [x_1=4, x_2=-4, x_3=2, x_4=-2]

174) $4x^4 - 5x^2 + 1 = 0$ [x_1=1, x_2=-1, $x_3=\frac{1}{2}$, $x_4=-\frac{1}{2}$]

175) $4x^4 - 17x^2 + 4 = 0$ [$x_1=\frac{1}{2}$, $x_2=-\frac{1}{2}$, x_3=2, x_4=-2]

176) $9x^4 - 10x^2 + 1 = 0$ [x_1=1, x_2=-1, x_3=$\frac{1}{3}$, x_4=$-\frac{1}{3}$]

177) $36x^4 - 25x^2 + 4 = 0$ [x_1=$\frac{1}{2}$, x_2=$-\frac{1}{2}$, x_3=$\frac{2}{3}$, x_4=$-\frac{2}{3}$]

178) $36x^4 - 97x^2 + 36 = 0$ [x_1=$\frac{3}{2}$, x_2=$-\frac{3}{2}$, x_3=$\frac{2}{3}$, x_4=$-\frac{2}{3}$]

179) $x^4 + 3x^2 - 4 = 0$ [x_1=1, x_2=-1]

180) $x^4 - 8x^2 - 9 = 0$ [x_1=3, x_2=-3]

181) $x^4 + 5x^2 - 36 = 0$ [x_1=2, x_2=-2]

182) $x^4 - 24x^2 - 25 = 0$ [x_1=5, x_2=-5]

183) $x^4 + 12x^2 - 64 = 0$ [x_1=2, x_2=-2]

184) $4x^4 + 3x^2 - 1 = 0$ [x_1=$\frac{1}{2}$, x_2=$-\frac{1}{2}$]

185) $4x^4 - 15x^2 - 4 = 0$ [x_1=2, x_2=-2]

186) $9x^4 + 8x^2 - 1 = 0$ [x_1=$\frac{1}{3}$, x_2=$-\frac{1}{3}$]

187) $36x^4 + 65x^2 - 36 = 0$ [x_1=$\frac{2}{3}$, x_2=$-\frac{2}{3}$]

188) $x^4 + 5x^2 + 4 = 0$ [impossibile]

189) $x^4 + 10x^2 + 9 = 0$ [impossibile]

190) $x^4 + 13x^2 + 36 = 0$ [impossibile]

191) $x^4 + 26x^2 + 25 = 0$ [impossibile]

192) $x^4 + 20x^2 + 64 = 0$ [impossibile]

193) $4x^4 + 5x^2 + 1 = 0$ [impossibile]

194) $4x^4 + 17x^2 + 4 = 0$ [impossibile]

195) $9x^4 + 10x^2 + 1 = 0$ [impossibile]

196) $36x^4 + 25x^2 + 364 = 0$ [impossibile]

197) $36x^4 + 97x^2 + 36 = 0$ [impossibile]

198) $x^6 - 9x^3 + 8 = 0$ [x_1=1, x_2=2]

199) $x^6 - 7x^3 - 8 = 0$ [x_1=-1, x_2=2]

200) $x^6 + 7x^3 - 8 = 0$ [x_1=1, x_2=-2]

201) $x^6 + 9x^3 + 8 = 0$ [x_1=-2, x_2=-1]

202) $x^6 - 3x^3 + 2 = 0$ [x_1=1, x_2=3]

203) $x^6 + 28x^3 + 27 = 0$ [x_1=-3, x_2=-1]

204) $x^6 + 26x^3 - 27 = 0$ [x_1=1, x_2=-3]

205) $x^6 - 26x^3 - 27 = 0$ [x_1=3, x_2=-1]

206) $8x^6 - 65x^3 + 8 = 0$ [x_1=2, x_2=$\frac{1}{2}$]

207) $8x^6 - 63x^3 - 8 = 0$ [x_1=2, x_2=$-\frac{1}{2}$]

208) $8x^6 + 63x^3 - 8 = 0$ [x_1=$\frac{1}{2}$, x_2=-2]

209) $8x^6 + 65x^3 + 8 = 0$ [x_1=-2, x_2=$-\frac{1}{2}$]

210) $27x^6 - 224x^3 + 64 = 0$ [x_1=2, x_2=$\frac{2}{3}$]

211) $27x^6 - 721x^3 - 216 = 0$ [x_1=3, x_2=$-\frac{2}{3}$]

212) $8x^6 - 35x^3 + 27 = 0\,0$ [x_1=1, x_2=$\frac{3}{2}$]

213) $8x^6 + 37x^3 - 216 = 0$ [x_1=-2, x_2=$\frac{3}{2}$]

214) $x^6 - 117x^3 - 1000 = 0$ [x_1=5, x_2=-2]

215) $x^6 - 37x^3 - 1728 = 0$ [x_1=4, x_2=-3]

216) $x^6 - 91x^3 + 1728 = 0$ [x_1=3, x_2=4]

217) $x^6 + 152x^3 + 3375 = 0$ [x_1=-3, x_2=-5]

218) $729x^6 + 189x^3 - 8 = 0$ [x_1=$\frac{1}{3}$, x_2=$-\frac{2}{3}$]

219) $64x^6 + 208x^3 - 27 = 0$ [x_1=$-\frac{3}{2}$, x_2=$\frac{1}{2}$]

220) $512x^6 - 152x^3 - 27 = 0$ [x_1=$-\frac{1}{2}$, x_2=$\frac{3}{4}$]

221) $216x^6 - 721x^3 - 27 = 0$ $\left[x_1 = -\frac{1}{3},\ x_2 = \frac{3}{2}\right]$