∝ Euclid Automated Prover

// Lemma Substitutions //

// Axioms (Syntax & Semantics assumed valid) //

$1 + 1 = 2$ (0000)

$1 + 2 = 3$ (0001)

$2 + 2 = 4$ (0002)

$1 + 4 = 5$ (0003)

$3 + 3 = 6$ (0004)

$1 + 6 = 7$ (0005)

$4 + 4 = 8$ (0006)

$1 + 8 = 9$ (0007)

$5 + 5 = 10$ (0008)

$1 + 10 = 11$ (0009)

$6 + 6 = 12$ (0010)

$1 + 12 = 13$ (0011)

$7 + 7 = 14$ (0012)

$1 + 14 = 15$ (0013)

$8 + 8 = 16$ (0014)

$1 + 16 = 17$ (0015)

$9 + 9 = 18$ (0016)

$1 + 18 = 19$ (0017)

$10 + 10 = 20$ (0018)

$1 + 20 = 21$ (0019)

$11 + 11 = 22$ (0020)

$1 + 22 = 23$ (0021)

$12 + 12 = 24$ (0022)

$1 + 24 = 25$ (0023)

$13 + 13 = 26$ (0024)

$1 + 26 = 27$ (0025)

$14 + 14 = 28$ (0026)

$1 + 28 = 29$ (0027)

$15 + 15 = 30$ (0028)

$1 + 30 = 31$ (0029)

$16 + 16 = 32$ (0030)

$1 + 32 = 33$ (0031)

$17 + 17 = 34$ (0032)

$1 + 34 = 35$ (0033)

$18 + 18 = 36$ (0034)

$1 + 36 = 37$ (0035)

$19 + 19 = 38$ (0036)

$1 + 38 = 39$ (0037)

$20 + 20 = 40$ (0038)

$1 + 40 = 41$ (0039)

$21 + 21 = 42$ (0040)

$1 + 42 = 43$ (0041)

$22 + 22 = 44$ (0042)

$1 + 44 = 45$ (0043)

$23 + 23 = 46$ (0044)

$1 + 46 = 47$ (0045)

$24 + 24 = 48$ (0046)

$1 + 48 = 49$ (0047)

$25 + 25 = 50$ (0048)

$1 + 50 = 51$ (0049)

$26 + 26 = 52$ (0050)

$1 + 52 = 53$ (0051)

$27 + 27 = 54$ (0052)

$1 + 54 = 55$ (0053)
$28 + 28 = 56$ (0054)
$1 + 56 = 57$ (0055)
$29 + 29 = 58$ (0056)
$1 + 58 = 59$ (0057)
$30 + 30 = 60$ (0058)
$1 + 60 = 61$ (0059)
$31 + 31 = 62$ (0060)
$1 + 62 = 63$ (0061)
$32 + 32 = 64$ (0062)
$1 + 64 = 65$ (0063)
$33 + 33 = 66$ (0064)
$1 + 66 = 67$ (0065)
$34 + 34 = 68$ (0066)
$1 + 68 = 69$ (0067)
$35 + 35 = 70$ (0068)
$1 + 70 = 71$ (0069)
$36 + 36 = 72$ (0070)
$1 + 72 = 73$ (0071)
$37 + 37 = 74$ (0072)
$1 + 74 = 75$ (0073)
$38 + 38 = 76$ (0074)
$1 + 76 = 77$ (0075)
$39 + 39 = 78$ (0076)
$1 + 78 = 79$ (0077)
$40 + 40 = 80$ (0078)
$1 + 80 = 81$ (0079)
$41 + 41 = 82$ (0080)
$1 + 82 = 83$ (0081)
$42 + 42 = 84$ (0082)
$1 + 84 = 85$ (0083)

$43 + 43 = 86$ (0084)
$1 + 86 = 87$ (0085)
$44 + 44 = 88$ (0086)
$1 + 88 = 89$ (0087)
$45 + 45 = 90$ (0088)
$1 + 90 = 91$ (0089)
$46 + 46 = 92$ (0090)
$1 + 92 = 93$ (0091)
$47 + 47 = 94$ (0092)
$1 + 94 = 95$ (0093)
$48 + 48 = 96$ (0094)
$1 + 96 = 97$ (0095)
$49 + 49 = 98$ (0096)
$1 + 98 = 99$ (0097)
$50 + 50 = 100$ (0098)
$1 + 100 = 101$ (0099)
$51 + 51 = 102$ (0100)
$1 + 102 = 103$ (0101)
$52 + 52 = 104$ (0102)
$1 + 104 = 105$ (0103)
$53 + 53 = 106$ (0104)
$1 + 106 = 107$ (0105)
$54 + 54 = 108$ (0106)
$1 + 108 = 109$ (0107)
$55 + 55 = 110$ (0108)
$1 + 110 = 111$ (0109)
$56 + 56 = 112$ (0110)
$1 + 112 = 113$ (0111)
$57 + 57 = 114$ (0112)
$1 + 114 = 115$ (0113)

$58 + 58 = 116$ (0114)
$1 + 116 = 117$ (0115)
$59 + 59 = 118$ (0116)
$1 + 118 = 119$ (0117)
$60 + 60 = 120$ (0118)
$1 + 120 = 121$ (0119)
$61 + 61 = 122$ (0120)
$1 + 122 = 123$ (0121)
$62 + 62 = 124$ (0122)
$1 + 124 = 125$ (0123)
$63 + 63 = 126$ (0124)
$1 + 126 = 127$ (0125)
$64 + 64 = 128$ (0126)
$1 + 128 = 129$ (0127)
$65 + 65 = 130$ (0128)
$1 + 130 = 131$ (0129)
$66 + 66 = 132$ (0130)
$1 + 132 = 133$ (0131)
$67 + 67 = 134$ (0132)
$1 + 134 = 135$ (0133)
$68 + 68 = 136$ (0134)
$1 + 136 = 137$ (0135)
$69 + 69 = 138$ (0136)
$1 + 138 = 139$ (0137)
$70 + 70 = 140$ (0138)
$1 + 140 = 141$ (0139)
$71 + 71 = 142$ (0140)
$1 + 142 = 143$ (0141)
$72 + 72 = 144$ (0142)
$1 + 144 = 145$ (0143)
$73 + 73 = 146$ (0144)

$1 + 146 = 147$ (0145)
$74 + 74 = 148$ (0146)
$1 + 148 = 149$ (0147)
$75 + 75 = 150$ (0148)
$1 + 150 = 151$ (0149)
$76 + 76 = 152$ (0150)
$1 + 152 = 153$ (0151)
$77 + 77 = 154$ (0152)
$1 + 154 = 155$ (0153)
$78 + 78 = 156$ (0154)
$1 + 156 = 157$ (0155)
$79 + 79 = 158$ (0156)
$1 + 158 = 159$ (0157)
$80 + 80 = 160$ (0158)
$1 + 160 = 161$ (0159)
$81 + 81 = 162$ (0160)
$1 + 162 = 163$ (0161)
$82 + 82 = 164$ (0162)
$1 + 164 = 165$ (0163)
$83 + 83 = 166$ (0164)
$1 + 166 = 167$ (0165)
$84 + 84 = 168$ (0166)
$1 + 168 = 169$ (0167)
$85 + 85 = 170$ (0168)
$1 + 170 = 171$ (0169)
$86 + 86 = 172$ (0170)
$1 + 172 = 173$ (0171)
$87 + 87 = 174$ (0172)
$1 + 174 = 175$ (0173)
$88 + 88 = 176$ (0174)

$1 + 176 = 177$ (0175)
$89 + 89 = 178$ (0176)
$1 + 178 = 179$ (0177)
$90 + 90 = 180$ (0178)
$1 + 180 = 181$ (0179)
$91 + 91 = 182$ (0180)
$1 + 182 = 183$ (0181)
$92 + 92 = 184$ (0182)
$1 + 184 = 185$ (0183)
$93 + 93 = 186$ (0184)
$1 + 186 = 187$ (0185)
$94 + 94 = 188$ (0186)
$1 + 188 = 189$ (0187)
$95 + 95 = 190$ (0188)
$1 + 190 = 191$ (0189)
$96 + 96 = 192$ (0190)
$1 + 192 = 193$ (0191)
$97 + 97 = 194$ (0192)
$1 + 194 = 195$ (0193)
$98 + 98 = 196$ (0194)
$1 + 196 = 197$ (0195)
$99 + 99 = 198$ (0196)
$1 + 198 = 199$ (0197)
$100 + 100 = 200$ (0198)
$1 + 200 = 201$ (0199)
$101 + 101 = 202$ (0200)
$1 + 202 = 203$ (0201)
$102 + 102 = 204$ (0202)
$1 + 204 = 205$ (0203)
$103 + 103 = 206$ (0204)
$1 + 206 = 207$ (0205)

$104 + 104 = 208$ (0206)
$1 + 208 = 209$ (0207)
$105 + 105 = 210$ (0208)
$1 + 210 = 211$ (0209)
$106 + 106 = 212$ (0210)
$1 + 212 = 213$ (0211)
$107 + 107 = 214$ (0212)
$1 + 214 = 215$ (0213)
$108 + 108 = 216$ (0214)
$1 + 216 = 217$ (0215)
$109 + 109 = 218$ (0216)
$1 + 218 = 219$ (0217)
$110 + 110 = 220$ (0218)
$1 + 220 = 221$ (0219)
$111 + 111 = 222$ (0220)
$1 + 222 = 223$ (0221)
$112 + 112 = 224$ (0222)
$1 + 224 = 225$ (0223)
$113 + 113 = 226$ (0224)
$1 + 226 = 227$ (0225)
$114 + 114 = 228$ (0226)
$1 + 228 = 229$ (0227)
$115 + 115 = 230$ (0228)
$1 + 230 = 231$ (0229)
$116 + 116 = 232$ (0230)
$1 + 232 = 233$ (0231)
$117 + 117 = 234$ (0232)
$1 + 234 = 235$ (0233)
$118 + 118 = 236$ (0234)
$1 + 236 = 237$ (0235)

$119 + 119 = 238$

$1 + 238 = 239$ (0237)

$120 + 120 = 240$ (0238)

$1 + 240 = 241$ (0239)

$121 + 121 = 242$ (0240)

$1 + 242 = 243$ (0241)

$122 + 122 = 244$ (0242)

$1 + 244 = 245$ (0243)

$123 + 123 = 246$ (0244)

Prove : $1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1$
$+ 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
$1 + 1 + 1 + 1 + 1 + 1 = 246$

(0245)

1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +

$$= 1 + 1 + 15_{(13)} + 15_{(13)} + 15_{(13)} + 15_{(13)} + 1 + 15_{(13)} + 15_{(13)} + 1 + 15_{(13)} + 15_{(13)} + 15_{(13)}$$

$$= 1 + 1 + 1_{(13)} + 1_{(13)} +_{(13)} 14_{(13)} + 1_{(13)} +_{(13)} 14_{(13)} + 1_{(13)} +_{(13)} 14_{(13)} + 1_{(13)} +_{(13)} 14_{(13)} + 1_{(13)} +_{(13)} 14_{(13)} 14_{(13)} + 1_{(13)} +_{(13)} 14_{(13)} + 1_{(13)} +_{(13)} 14_{(13)}$$

$$= 1 + 1 + 1 + 14_{(12)} + 1 + 14_{(12)} + 1 + 14_{(12)} + 1 + 14_{(12)} + 1 + 1 + 14_{(12)} + 1 + 14_{(12)} + 1 + 14_{(12)} + 1 + 14_{(12)} + 1 + 14_{(12)}$$

$$= 1 + 1 + 1 + 1 + 7_{(12)} +_{(12)} 7_{(12)} +_{(12)} 7_{(12)} + 1 + 7_{(12)} +_{(12)} 7_{(12)} + 1 + 7_{(12)} +_{(12)} 7_{(12)} + 1 + 7_{(12)} +_{(12)} 7_{(12)} + 1 + 7_{(12)} +_{(12)} 7_{(12)} + 1 + 7_{(12)} +_{(12)} 7_{(12)}$$

$$+_{(59)} 60_{(59)} + 1_{(59)} +_{(59)} 60_{(59)} + 1_{(59)} +_{(59)} 60_{(59)} + 1_{(59)} +_{(59)} 60_{(59)} + 1 + 1_{(59)}$$

$$= 1 + 1 + 60_{(58)} + 1 + 60_{(58)} + 1 + 1 + 60_{(58)} + 1 + 1$$

$$60_{(58)}$$

$$= 1 + 1 + 30_{(58)} +_{(58)} 30_{(58)} + 1 + 30_{(58)} +_{(58)} 30_{(58)} + 1 + 30_{(58)} +_{(58)} 30_{(58)}$$

$$30_{(58)} +_{(58)} 30_{(58)}$$

$$= 1 + 1 + 30_{(28)} + 30_{(28)} + 1 + 30_{(28)} + 30_{(28)} + 1 + 1$$

$$+ 30_{(28)} + 30_{(28)} + 1 + 30_{(28)} + 30_{(28)}$$

$$= 1 + 1 + 15_{(28)} +_{(28)} 15_{(28)} +_{(28)} 15_{(28)} +_{(28)} 15_{(28)} + 1$$

$$15_{(28)} +_{(28)} 15_{(28)} +_{(28)} 15_{(28)} +_{(28)} 15_{(28)}$$

$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + \ldots$

(This page consists entirely of extremely long repeated sums of the form $1 + 1 + 1 + \cdots$ interspersed with subscripted terms such as $3_{(1)}$, $7_{(5)}$, $6_{(5)}$, $1_{(5)}$, $6_{(4)}$, $3_{(4)}$, $2_{(0)}$, $1_{(1)}$, and $2_{(1)}$, arranged in several column blocks.)

Top-left block (terms with $3_{(1)}$):

$\ldots 1 + 3_{(1)} + 3_{(1)} + 1 + 3_{(1)} + 3_{(1)} + 1 + 1 + 3_{(1)} + 1 + 3_{(1)} + 1 + 3_{(1)} + 1 + 3_{(1)} + 1 + 3_{(1)} + 1 + 3_{(1)} + 3_{(1)} + 1 + 1 + 3_{(1)} + 3_{(1)} + 1 + 1 + 1 + 3_{(1)} + 1 + 3_{(1)} + 1 + 3_{(1)} + 1 + 1 + 3_{(1)} + 1 + 3_{(1)} + 3_{(1)} + 1 + 3_{(1)}$

Top-middle block (terms with $1_{(1)}$, $2_{(1)}$):

$\ldots 1_{(1)} +_{(1)} 2_{(1)} +_{(1)} 1_{(1)} 2_{(1)} + 1 + 1_{(1)} +_{(1)} 2_{(1)} + 1 +_{(1)} 2_{(1)} + 1 + 1 +_{(1)} 1_{(1)} +_{(1)} 2_{(1)} + 1_{(1)} +_{(1)} 2_{(1)} \ldots$

Top-right block (terms with $2_{(0)}$):

$\ldots 1 + 2_{(0)} + 1 + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 1 + 2_{(0)} + 1 + 2_{(0)} + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1$

Bottom-left block (terms with $7_{(5)}$):

$\ldots 7_{(5)} + 1 + 7_{(5)} + 7_{(5)} + 1 + 1 + 7_{(5)} + 7_{(5)} + 1 + 7_{(5)} + 7_{(5)} + 1 + 7_{(5)} + 7_{(5)} + 1 + 1 + 7_{(5)} + 7_{(5)} + 1 + 7_{(5)} \ldots$

Bottom block (terms with $6_{(5)}$, $1_{(5)}$):

$\ldots 6_{(5)} + 1 + 1_{(5)} +_{(5)} 6_{(5)} + 1 + 1_{(5)} +_{(5)} 6_{(5)} + 1_{(5)} +_{(5)} 6_{(5)} + 1 + 1_{(5)} +_{(5)} 6_{(5)} + 1_{(5)} +_{(5)} 6_{(5)} \ldots$

Bottom-middle block (terms with $6_{(4)}$):

$\ldots 1 + 1 + 1 + 6_{(4)} + 1 + 1 + 6_{(4)} + 1 + 1 + 6_{(4)} + 1 + 1 + 6_{(4)} + 1 + 1 + 6_{(4)} + 1 + 1 + 6_{(4)} \ldots$

Bottom-right block (terms with $3_{(4)}$):

$\ldots 3_{(4)} + 1 + 1 + 3_{(4)} +_{(4)} 3_{(4)} + 1 + 1 + 3_{(4)} +_{(4)} 3_{(4)} + 1 + 1 + 3_{(4)} +_{(4)} 3_{(4)} + 1 + 3_{(4)} +_{(4)} 3_{(4)} + 1 \ldots$

$2_{(0)} + 1 + 2_{(0)} + 1 + 1 + 1 + 1 + 1 + 2_{(0)} + 1 + 2_{(0)} + 1 + 1 + 1 + 1 + 2_{(0)}$
$+ 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 1 + 2_{(0)} + 1 + 2_{(0)} + 1 +$
$1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)}$
$+ 1 + 2_{(0)} + 1 + 1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 1 + 2_{(0)} + 1 + 2_{(0)} +$
$1 + 1 + 2_{(0)} + 1 + 1 + 2_{(0)} + 1 + 1 + 1 + 2_{(0)} + 1 + 2_{(0)} + 1 + 2_{(0)} +$
$1_{(0)}$

... (continues with repeated sums of $1 + 1 + 1 + \ldots$ and $1_{(0)}$, $+_{(0)}$ terms) ...

$= 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + \ldots$

... (continues with repeated sums of $1 + 1 + 1 + \ldots$) ...

$= 1 + 1 + 1 + 1 + 1 + 1 + 1 + \ldots$

... (continues with repeated sums of $1 + 1 + 1 + \ldots$) ...

Q.E.D. (via Auto)