1996 Q16

16. $1 - 2 - 3 + 4 + 5 - 6 - 7 + 8 + 9 - 10 - 11 + 12 + 13 - \cdots$
$$\cdots + 1992 + 1993 - 1994 - 1995 + 1996 =$$

(A) -998 **(B)** -1 **(C)** 0 **(D)** 1 **(E)** 998

16. **(C)** Combining in groups of four yields

$$1 - 2 - 3 + 4 = 0, \quad 5 - 6 - 7 + 8 = 0, \quad 9 - 10 - 11 + 12 = 0,$$

and so on. Since there are 499 groups of four in 1996, it follows that the sum is zero.

OR

Combining in pairs yields

$$\underbrace{\underbrace{(1-2)+(-3+4)}_{(-1)+1}}_{0} + \underbrace{\underbrace{(5-6)+(-7+8)}_{(-1)+1}}_{0} + \cdots + \underbrace{\underbrace{(1993-1994)+(-1995+1996)}_{(-1)+1}}_{0}$$

so the sum is 0.

16. $1990 - 1980 + 1970 - 1960 + \ldots - 20 + 10 =$

A) -990 B) -10 C) 990 D) 1000 E) 1990

1990 Q16

16. D By grouping as shown below, there are $\dfrac{199+1}{2} = 100$ groups of 10 for a sum of 1000:

$$[1990 - 1980] + [1970 - 1960] + \ldots + [30 - 20] + 10$$

3 / 4

1993 Q19

19. $(1901 + 1902 + 1903 + \cdots + 1993) - (101 + 102 + 103 + \cdots + 193) =$

(A) $167,400$ (B) $172,050$ (C) $181,071$ (D) $199,300$ (E) $362,142$

19. **(A)** Each number in the first set of numbers is 1800 more than the corresponding number in the second set:

$$1901, \quad 1902, \quad 1903, \ldots, \quad 1993$$
$$\underline{-101}, \quad \underline{-102}, \quad \underline{-103}, \ldots, \quad \underline{-193}$$
$$1800, \quad 1800, \quad 1800, \ldots, \quad 1800$$

Thus the sum of the first set of numbers is $93 \times 1800 = 167,400$ more than the sum of the second set.

4 / 4

1997 Q19

19. If the product $\dfrac{3}{2} \cdot \dfrac{4}{3} \cdot \dfrac{5}{4} \cdot \dfrac{6}{5} \cdot \ldots \cdot \dfrac{a}{b} = 9$, what is the sum of a and b?

(A) 11   (B) 13   (C) 17   (D) 35   (E) 37

2

19. **(D)** Since $\frac{3}{2} \cdot \frac{4}{3} \cdot \frac{5}{4} \cdot \frac{6}{5} \cdot \ldots \cdot \frac{a}{b} = 9,$ we see that $\frac{a}{2} = 9.$ Thus, $a = 18,$ $b = 17,$ and $a + b = 35.$