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Homework #4

Problem 19. total cost = (vol/subsc.) (# subsc.) (density) (cost per mass)

total cost = π $((1/2)$ $(10^{-3}))^2$ $(10^4$ m) (10^7) $(9.0$ g cm$^{-3})$ $(10^3$ kg/g) $((10^2)^3$ cm^3/m$^3)$ ($3/kg)

total cost = 21.20575 (10^8) dollars = **$2.1 billion**

Problem 22.   4 combinations means 2 bits per symbol.

(1200 symbol/s) (2 bit/symbol) = **2400 bps**

Problem 26.   64 combinations means 6 bits per symbol.

(3/4) (256 ch) (4312.5 cycle s^{-1} ch^{-1}) (1 symbol/cycle) (6 bit/symbol) = **4.968 Mbps**

Problem 40.   The OC-12c frame has $((12)(3) + 1)$ columns of overhead, 9 rows,

and $(12)(90)$ = 1080 total columns.

User BW = $(((1080 - 37)$ col (9 row))/frame) (1 byte/(col row)) (8 bit/byte) (8000 frame/s)

User BW = **600.768 Mbps**