CO2 may be an important alternative refrigerant to hydrofluorocarbons in commercial refrigeration systems. CO2 is one of the few natural refrigerants that is neither flammable nor toxic. It is inexpensive, widely available, and does not affect the global environment as do many other refrigerants. In this study, alternative methods are presented using artificial neural networks and adaptive neurofuzzy inference systems to determine thermodynamic and thermophysical properties of CO2. The results of the artificial neural network model are compared with those of the adaptive neurofuzzy inference system model in which the same datasets are used. The artificial neural network model is much better than the adaptive neurofuzzy inference system model. A new formulation is presented for the determination of the thermodynamic and thermophysical properties of CO2. The results of this study show that the artificial neural network model is an excellent alternative method for the calculation of thermodynamic and thermophysical properties of CO2. The use of this new formulation, which can be employed with any programming language or spreadsheet program for the calculation of thermodynamic and thermophysical properties of CO2, may make the use of dedicated artificial neural network software unnecessary.