**Data Types Worksheet 3**

**Floating Point Numbers**

Can you convert the following floating point binary representations into denary?

Use 8 bits for the mantissa and 4 bits for the exponent.

Remember that both the mantissa and exponent are represented in two’s complement.

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| --- | --- | --- |
|  |  | **Answer** |
| 1 | 0101 0001 0111 | 0101 0001 01110101 0001 0111 exponent is +70.101 0001 0111 mantissa is positiveMove decimal point forward seven places0101 0001. = +81 |
| 2 | 1000 0100 0101 | 1000 0100 01011000 0100 0101 exponent is +51.000 0100 0101 mantissa is negativeFind complement (swap all 1’s for 0’s and vice versa)0111 1011Add 10111 1100Move decimal point forward five places0111 11.00 = –31 (you have to remember to put the minus sign in!) |
| 3 | 0110 0110 0101 | 0110 0110 01010110 0110 0101 exponent is +50.110 0110 0101 mantissa is positiveMove decimal point forward five places011001.10 = +25.5 |
|  |  | **Answer** |
| 4 | 0100 1000 1110 | 0100 1000 11100100 1000 1110 exponent is –2 (because this is also in two’s complement)0.100 1000 1110 mantissa is positiveMove decimal point back two spaces0.001001000 = 1/8 + 1/64 = +0.140625 |
| 5 | 1011 1110 0100 | 1011 1110 01001011 1110 0100 exponent is +41.011 1110 0100 mantissa is negativeFind complement0100 0001Add 10100 0010Move decimal point forward four places01000.010 = –8.25 |
| 6 | 0110 0101 0100 | 0110 0101 01000110 0101 0100 exponent is +40.110 0101 0100 mantissa is positiveMove decimal point forward four spaces01100.101 = 12 + 1/2 + 1/8 = + 12.625 |