**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.

|  |  |  |
| --- | --- | --- |
|  |  | **Answer** |
| 1 | 0101 0001 0111 | 0101 0001 0111  0101 0001 0111 exponent is +7  0.101 0001 0111 mantissa is positive  Move decimal point forward seven places  0101 0001. = +81 |
| 2 | 1000 0100 0101 | 1000 0100 0101  1000 0100 0101 exponent is +5  1.000 0100 0101 mantissa is negative  Find complement (swap all 1’s for 0’s and vice versa)  0111 1011  Add 1  0111 1100  Move decimal point forward five places  0111 11.00 = –31 (you have to remember to put the minus sign in!) |
| 3 | 0110 0110 0101 | 0110 0110 0101  0110 0110 0101 exponent is +5  0.110 0110 0101 mantissa is positive  Move decimal point forward five places  011001.10 = +25.5 |
|  |  | **Answer** |
| 4 | 0100 1000 1110 | 0100 1000 1110  0100 1000 1110 exponent is –2 (because this is also in two’s complement)  0.100 1000 1110 mantissa is positive  Move decimal point back two spaces  0.001001000 = 1/8 + 1/64 = +0.140625 |
| 5 | 1011 1110 0100 | 1011 1110 0100  1011 1110 0100 exponent is +4  1.011 1110 0100 mantissa is negative  Find complement  0100 0001  Add 1  0100 0010  Move decimal point forward four places  01000.010 = –8.25 |
| 6 | 0110 0101 0100 | 0110 0101 0100  0110 0101 0100 exponent is +4  0.110 0101 0100 mantissa is positive  Move decimal point forward four spaces  01100.101 = 12 + 1/2 + 1/8 = + 12.625 |