**Assignment#1**

**Tianhao Liu**

**liux3271@umn.edu**

**Section: 014 (2:30pm on Thursday)**

**Problem #1**

1. g
2. h
3. f
4. a
5. c
6. b

**Problem #2**

|  |  |  |
| --- | --- | --- |
| Expression | Always True? | |
|  |  |  |
| (x<y) == (-x>-y) |  | N |
|  |  |  |
| ((x+y)<<4) + y-x == 17\*y+15\*x | Y |  |
| ˜x+˜y+1 == ˜(x+y) | Y |  |
|  |  |  |
| ux-uy == -(y-x) | Y |  |
|  |  |  |
| (x >= 0) || (x < ux) |  | N |
|  |  |  |
| ((x >> 1) << 1) <= x | Y |  |
|  |  |  |
| (double)(float) x == (double) x |  | N |
|  |  |  |
| dx + dy == (double) (y+x) |  | N |
|  |  |  |
| dx + (dy + dz) == dz + (dy + dx) | Y |  |
|  |  |  |
| dx \* (dy \* dz) == dz \* (dy \* dx) |  | N |

**Problem #3**

|  |  |  |
| --- | --- | --- |
| Number | Decimal Representation | Binary Representation |
|  |  |  |
|  |  |  |
| Zero | 0 | 000000 |
|  |  |  |
| n/a | -1 | 111111 |
|  |  |  |
| n/a | 17 | 010001 |
|  |  |  |
| n/a | -11 | 110101 |
|  |  |  |
| n/a | 26 | 011010 |
|  |  |  |
| n/a | -26 | 100110 |
|  |  |  |
| TMax | 31 | 011111 |
|  |  |  |
| TMin | -32 | 100000 |
|  |  |  |
| TMax+TMax | -2 | 111110 |
|  |  |  |
| TMin+TMin | 0 | 000000 |
|  |  |  |
| TMin+1 | -31 | 100001 |
|  |  |  |
| TMin-1 | 31 | 011111 |
| TMax+1 | -32 | 100000 |
|  |  |  |
| -TMax | -31 | 100001 |
| -TMin | -32 | 100000 |

**Problem #4**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Description | Hex | M | E | V | D |
| -0 | 8000 | 0 | -14 | -0 | -0.0 |
| Smallest value>2 | 4001 | 1025/1024 | 1 | 1025/1024\*2 | 2.001953 |
| 512 | 6000 | 1 | 9 | 512 | 512.0 |
| Largest denormalized | 03FF | 1023/1024 | -14 | 1023/1024\*2-14 | 0.000061 |
| -inf | FC00 |  |  | -inf | -inf |
| Number with hex  representation 3BBO | 3BBO | 123/64 | -1 | 123/64\*2-1 | 0.9609375 |

**Problem #5**

|  |  |  |  |
| --- | --- | --- | --- |
| Format A | | Format B | |
| 1 01111 001 | -9/8 | 1 0111 0010 | -9/8 |
| 0 10110 011 | 176 | 1 1110 0110 | 176 |
| 1 00111 010 | -5/1024 | 1 0000 0101 | -5/1024 |
| 0 00000 111 | 7/131072 | 0 0000 0001 | 1/1024 |
| 1 11100 000 | -8192 | 1 1110 1111 | -248 |
| 0 10111 100 | 384 | 0 1111 0000 | +inf |

**Problem #6**

float fpwr2(int x)

{

/\* Result exponent and fraction \*/

unsigned exp, frac;

unsigned u;

if (x < -149) {

/\* Too small. Return 0.0 \*/

exp = 0;

frac = 0;

}

else if (x < -126) {

/\* Denormalized result \*/

exp = 0;

frac = 1 << (x + 149);

}

else if (x < 128) {

/\* Normalized result \*/

exp = x + 127;

frac = 0;

}

else {

/\* Too big. Return +oo\*/

exp = 255;

frac = 0;

}

/\* Pack exp and frac into 32 bits \*/

u = exp << 23 | frac;

/\* Return as float \*/

return u2f(u);

}