

Informatik
Exercise Session

Consider the normalized floating point number system $F^*(\beta, p, e_{\min}, e_{\max})$ with $\beta = 2$, $p = 3$, $e_{\min} = -4$, $e_{\max} = 4$.

Compute the following expressions as the parentheses suggest, representing each intermediate result (and the final result) in the normalized floating point system according to the rules of computing with floating point numbers.

$(10 + 0.5) + 0.5$			$(0.5 + 0.5) + 10$		
decimal		binary	decimal		binary
10		?????	0.5		?????
+ 0.5		?????	+ 0.5		?????
=		?????	=		?????
+ 0.5		?????	+ 10		?????
= ??	←	?????	= ??	←	?????

$(10 + 0.5) + 0.5$			$(0.5 + 0.5) + 10$		
decimal		binary	decimal		binary
10		$1.01 \cdot 2^3$	0.5		?????
+ 0.5		$0.0001 \cdot 2^3$	+ 0.5		?????
=		?????	=		?????
+ 0.5		?????	+ 10		?????
= ??	←	?????	= ??	←	?????

$(10 + 0.5) + 0.5$			$(0.5 + 0.5) + 10$		
decimal		binary	decimal		binary
10		$1.01 \cdot 2^3$	0.5		?????
+ 0.5		$0.0001 \cdot 2^3$	+ 0.5		?????
=		$1.0101 \cdot 2^3$	=		?????
+ 0.5		?????	+ 10		?????
= ??	←	?????	= ??	←	?????

$(10 + 0.5) + 0.5$			$(0.5 + 0.5) + 10$		
decimal		binary	decimal		binary
10		$1.01 \cdot 2^3$	0.5		?????
+ 0.5		$0.0001 \cdot 2^3$	+ 0.5		?????
=		$1.01 \cdot 2^3$	=		?????
+ 0.5		$0.0001 \cdot 2^3$	+ 10		?????
= ??	←	?????	= ??	←	?????

$(10 + 0.5) + 0.5$			$(0.5 + 0.5) + 10$		
decimal		binary	decimal		binary
10		$1.01 \cdot 2^3$	0.5		?????
+ 0.5		$0.0001 \cdot 2^3$	+ 0.5		?????
=		$1.01 \cdot 2^3$	=		?????
+ 0.5		$0.0001 \cdot 2^3$	+ 10		?????
= 10	←	$1.01 \cdot 2^3$	= ??	←	?????

$(10 + 0.5) + 0.5$			$(0.5 + 0.5) + 10$		
decimal		binary	decimal		binary
10		$1.01 \cdot 2^3$	0.5		$1.00 \cdot 2^{-1}$
+ 0.5		$0.0001 \cdot 2^3$	+ 0.5		$1.00 \cdot 2^{-1}$
=		$1.01 \cdot 2^3$	=		?????
+ 0.5		$0.0001 \cdot 2^3$	+ 10		?????
= 10	←	$1.01 \cdot 2^3$	= ??	←	?????

$(10 + 0.5) + 0.5$		$(0.5 + 0.5) + 10$	
decimal	binary	decimal	binary
10	$1.01 \cdot 2^3$	0.5	$1.00 \cdot 2^{-1}$
+ 0.5	$0.0001 \cdot 2^3$	+ 0.5	$1.00 \cdot 2^{-1}$
=	$1.01 \cdot 2^3$	=	$1.00 \cdot 2^0$
+ 0.5	$0.0001 \cdot 2^3$	+ 10	$1010.00 \cdot 2^0$
= 10	$\leftarrow 1.01 \cdot 2^3$	= ??	$\leftarrow ??????$

$(10 + 0.5) + 0.5$		$(0.5 + 0.5) + 10$	
decimal	binary	decimal	binary
10	$1.01 \cdot 2^3$	0.5	$1.00 \cdot 2^{-1}$
+ 0.5	$0.0001 \cdot 2^3$	+ 0.5	$1.00 \cdot 2^{-1}$
=	$1.01 \cdot 2^3$	=	$1.00 \cdot 2^0$
+ 0.5	$0.0001 \cdot 2^3$	+ 10	$1010.00 \cdot 2^0$
= 10	$\leftarrow 1.01 \cdot 2^3$	= ??	$\leftarrow 1011.00 \cdot 2^0$

$(10 + 0.5) + 0.5$		$(0.5 + 0.5) + 10$	
decimal	binary	decimal	binary
10	$1.01 \cdot 2^3$	0.5	$1.00 \cdot 2^{-1}$
+ 0.5	$0.0001 \cdot 2^3$	+ 0.5	$1.00 \cdot 2^{-1}$
=	$1.01 \cdot 2^3$	=	$1.00 \cdot 2^0$
+ 0.5	$0.0001 \cdot 2^3$	+ 10	$1010.00 \cdot 2^0$
= 10	$\leftarrow 1.01 \cdot 2^3$	= ??	$\leftarrow 1.011 \cdot 2^3$

$(10 + 0.5) + 0.5$		$(0.5 + 0.5) + 10$	
decimal	binary	decimal	binary
10	$1.01 \cdot 2^3$	0.5	$1.00 \cdot 2^{-1}$
+ 0.5	$0.0001 \cdot 2^3$	+ 0.5	$1.00 \cdot 2^{-1}$
=	$1.01 \cdot 2^3$	=	$1.00 \cdot 2^0$
+ 0.5	$0.0001 \cdot 2^3$	+ 10	$1010.00 \cdot 2^0$
= 10	$\leftarrow 1.01 \cdot 2^3$	= 12	$\leftarrow 1.10 \cdot 2^3$