1. [5]How many elements are in the following type?

```
SomeType ::= Red
           | Blue Bool
           | Green Bool Bool
```

A. 8
B. 7
C. 6
D. 3

2. [5]How many elements are in the following type?

```
Etyb ::= Etyb Bool Bool Bool Bool Bool Bool Bool Bool
```

A. 256
B. 8
C. 512
D. 1

3. [5]What is the type of the following function?

```
h f g (x :: xs) = f g
h f g []        = g
```

A. (A $\rightarrow A) \rightarrow (A \rightarrow B) \rightarrow$ List $B \rightarrow A$
B. $(A \rightarrow B) \rightarrow B \rightarrow$ List $B \rightarrow B$
C. $(A \rightarrow A) \rightarrow A \rightarrow$ List $B \rightarrow A$
D. $A \rightarrow A \rightarrow$ List $B \rightarrow A$

4. [5]What is the type of the following function?

```
f Zero        = True
f (Succ Zero) = False
```

A. $\mathbb{B} \rightarrow \mathbb{N}$
B. $\mathbb{B}$
C. $\mathbb{N}$
D. $\mathbb{N} \rightarrow \mathbb{B}$

5. [5]What is the result of `baz (< 2) [0,1,2,3,4,5]`?

```
baz : (A -> Bool) -> List A -> List A
baz f []        = []
baz f (x :: xs) = f x match
                     True  -> x :: baz f xs
                     False -> baz f xs
```

A. []
B. [2,3,4,5]
C. [0,1]
D. [0,1,2]

6. [5]What is the result of `bar (not) [True, False, True, False]`. Given:

```
bar : (A -> B) -> List A -> List B
bar f []        = []
bar f (x :: xs) = (f x) : bar f xs
```

A. [True, True, True, True]
B. [False, False, False, False]
C. [True, False, True, False]
D. [False, True, False, True]

7. [5]Which of these types represent the counting numbers?
A. $\mathbb{Z}$
B. $\mathbb{B}$
C. **List**
D. $\mathbb{N}$

8. [5]What is the type of the following function?

```
f 0 p = p 0
f n p = not (p n)
```

A. $\mathbb{N} \to (\mathbb{N} \to \mathbb{B}) \to \mathbb{B}$
B. $\mathbb{N} \to (\mathbb{B} \to \mathbb{N}) \to \mathbb{B}$
C. $\mathbb{B}$
D. $\mathbb{N} \to \mathbb{B} \to \mathbb{B}$

9. [5]What is the type of the following list? xs = (Cons 5 (Cons 4 (Cons "Three" (Cons 2.0 Empty))))?
A. List $\mathbb{N}$
B. List $\mathbb{R}$
C. None, It is not well-typed.
D. List **String**

10. [5]What is the result of `foo (+) 1 [1,2,3,4])`. Given the following definition of foo

```
foo : (A -> B -> B) -> B -> List A -> B
foo f b []        = b
foo f b (x :: xs) = foo f (f x b) xs
```

A. 24
B. 10

C. 11
D. 4

11. [5]What is the type of the following function?

```
g True (x :: xs) = xs
g n xs = xs
```

A. $\mathbb{B} \rightarrow$ List $\mathbb{B} ightarrow$List $\mathbb{B}$
B. $\mathbb{B} \rightarrow$ List $A \rightarrow A$
C. $\mathbb{B} \rightarrow$ List $\mathbb{N} ightarrow$List $\mathbb{N}$
D. $\mathbb{B} \rightarrow$ List $A \rightarrow$ List A

12. [5]How many elements are in the following type?

```
SomeType ::= Red SomeType
           | Blue
```

A. 1
B. 0, It is not a valid type
C. Infinity
D. 2

13. [5]What is the name of the following function?

```
foo : (A -> B -> B) -> B -> List A -> B
foo f b []        = b
foo f b (x :: xs) = foo f (f x b) xs
```

A. map
B. fold
C. prod
D. reduce

14. [5]A function which always returns y when given the same x is:
A. tail-recursive
B. pure
C. polymorphic
D. higher-ordered

15. [5]A function is called this when it's type may change depending on what arguments it is given:
A. dependent
B. tail-recursive
C. total
D. polymorphic

16. [5]The following function is tail-recursive:

```
foo : (A -> B -> B) -> B -> List A -> B
foo f b []        = b
foo f b (x :: xs) = foo f (f x b) xs
```

A. True
B. False

17. [5]This is the type of functions which only make recursive calls when therecursive call is the only computation being performed on the right-hand sideof the definition
    A. total
    B. dependent
    C. polymorphic
    D. tail-recursive

18. [5]What is the type of `Just 15`?
    A. $\mathbb{N}$
    B. Maybe $\mathbb{N}$
    C. None, it is not well-typed
    D. Z

19. [5]What is the name of the type we use to handle error in functions?
    A. **List**
    B. **Maybe**
    C. $\mathbb{B}$
    D. **Tree**

20. [5]Which of the following types always has exactly two elements?
    A. **List**
    B. $\mathbb{N}$
    C. **Maybe**
    D. $\mathbb{B}$

21. [5]A function which takes another function as an argument is:
    A. compositional
    B. tail-recursive
    C. higher-ordered
    D. dependent

22. [5]What is the name of the following function?

```
baz : (A -> Bool) -> List A -> List A
baz f []        = []
baz f (x :: xs) = f x match
                      True  -> x :: baz f xs
                      False -> baz f xs
```

A. sum

B. filter
C. reduce
D. fold

23. [5]Which is the correct way of encoding the *integer* 3?
    A. Cons (Cons (Cons Empty))
    B. Positive (Succ (Succ (Succ Zero)))
    C. Positive (Succ (Succ (Succ (Positive Zero))))
    D. Succ (Succ (Succ Zero))

24. [5]Is the following function tail recursive?

```
bar : (A -> B) -> List A -> List B
bar f []        = []
bar f (x :: xs) = (f x) : bar f xs
```

    A. No
    B. Yes

25. [5]Which of these types is polymorphic?
    A. $\mathbb{N}$
    B. $\mathbb{Z}$
    C. **Maybe**
    D. $\mathbb{B}$

26. [5]A function which is defined over the entire input domain is called:
    A. total
    B. higher-ordered
    C. tail-recursive
    D. pure

27. [5]What is the name of the following function?

```
bar : (A -> B) -> List A -> List B
bar f []        = []
bar f (x :: xs) = (f x) : bar f xs
```

    A. sum
    B. fold
    C. reduce
    D. map