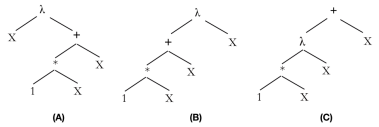
2018 10.2 Score:

1. Starting with an empty stack, what sequence of operations will yield the string **MIRE** from the incoming string **LIMERICK**. *Note*: It is acceptable for there to still be characters on the stack and/or on the incoming string when your output is complete.

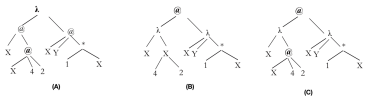
A) OOOXXOOXXX
B) OOOXXXOOXX
C) OOXOXOOXX
D) OOOXXOOXX
E) OOOXXOOOX

2. Which of the following ASTs is equivalent to (λ x. + (* 1 x) x)?



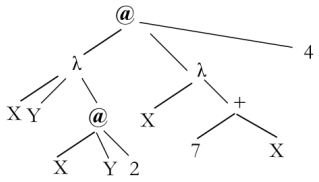
A) A
B) B
C) C

3. Which AST is equivalent to ((λ x. x 4 2) (λ xy. * 1 x))?



A) A
B) B
C) C

4. What is the equivalent lambda expression for this AST?



A) (λ x. + 7 x) (λ xy. * x y) 4
B) (λ xy. * x y) (λ x. + 7 x) 4
C) (λ x. + 7 x) (λ xy. x y 2) 4
D) (λ xy. x y 2) (λ x. + 7 x) 4
E) (λ xy. x 4 2) (λ x. + 7 x) 4

5. What does this lambda expression evaluate to? ((λ xyz. y x z) 1 / 3)

A) 3
B) 1/3
C) .33
D) 9
E) 1/9

6. What is the output of the following input to Racket?

```
(define y 4)
(define z ((lambda (z) (+ z z )) y))
z
```

A) 3
B) 4
C) 8
D) 6
E) 7
F) z is a function

7. What is the value for **x** after the following code is executed in Racket?

```
(define x 1)
(define y 2)
(define z 3)
(define addy (lambda (z) (+ z y)))
(define messy (lambda (x z) (+ (addy z) (addy x))))
(messy (addy x) (addy z))
```

A) 3
B) 2
C) 1
D) 12
E) 6

8. Given the following expression, which statements are true?

```
( (lambda (x) (x y z) ) (lambda (z) (y z)))
```

A) x occurs free; y occurs free; z occurs both free and bound.
B) x occurs free; y occurs both free and bound; z occurs bound.
C) x occurs bound; y occurs both free and bound; z occurs bound.
D) x occurs bound; y occurs bound; z occurs bound.
E) x occurs bound; y occurs free; z occurs both free and bound.

9. Given the following expression, which statement is true?

```
(lambda (y) (lambda (x) (x y)) (lambda (z (z y))) y)
```

A) x occurs bound; y occurs free; z occurs bound.
B) x occurs bound; y occurs both free and bound; z occurs bound.
C) x occurs free; y occurs free; z occurs free.
D) x occurs bound; y occurs bound; z occurs bound.
E) x occurs both free and bound; y occurs both free and bound; z occurs both free and bound.