4.

a. countEven(int[] list, int index)

```
countEven(int[] list, int index)
        if(list.length == index) { (3 steps)
                return 0 (1 step)
        } else if(list[index] mod 2 == 0) { (3 steps)
                return 1 + countEven(list, index + 1) (
        } else {
                return countEven(list, index + 1)
}
```

b. $T(n) = T(n - 1) + c_2$

c. $T(1) = c_1$

$n - x = 1$

$x = n - 1$

$T(n - 1) = T(n - 1) + c_2$

$T(n) = T(n - 2) + c_2 + c_2$

$T(n) = T(n - x) + c_2 * x$

$= T(n - (n - 1)) + c_2(n -1)$

$= T(1) + c_2 n - c_2$

Closed Form

$T(n) = c_1 + c_2n - c_2$

d. Conjecture: $T(n) = c_1 + c_2n - c_2$ is equivalent to the Recurrence Relation $T(n)\{$

$T(n - 1) + c_2$ if $n > 1$, $c_1$ if $n = 1\}$

Basis Step: $T(1) = c_1 + c_2n - c_2$

$n = 1$

$T(1) = c_1 + c_2(1) - c_2$

$T(1) = c_1 + c_2 - c_2$

$T(1) = c_1$

The basis step holds

Inductive Step:

IH: If $T(k) = c_1 + c_2(k) - c_2$, then $T(k + 1) = c_1 + c_2k$

Assume by IH that $T(k) = c_1 + c_2k - c_2$

then we know that

$T(k + 1) = T((k + 1) - 1) + c_2$

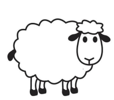
$T(k + 1) = T(k) + c_2$

$= c_1 + c_2k - c_{2,} + c_2$

$T(k +1) = c_1 + c_2k$

Therefore inductive step holds.

Because both the inductive and basis steps hold true, the conjecture is true.



$Q^{ED}$