Valid Perfect Square

Given a positive integer *num*, write a function which returns True if *num* is a perfect square else False.

Note: Do not use any built-in library function such as `sqrt`.

Example 1:

```
Input: 16
Returns: True
```

Example 2:

```
Input: 14
Returns: False
```

Credits:
Special thanks to @elmirap for adding this problem and creating all test cases.

Solution 1

```java
public boolean isPerfectSquare(int num) {
    int i = 1;
    while (num > 0) {
        num -= i;
        i += 2;
    }
    return num == 0;
}
```

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Solution 2

1. a square number is 1+3+5+7+... Time Complexity O(sqrt(N)) (Credit to lizhibupt, thanks for correcting this).
2. binary search. Time Complexity O(logN)
3. Newton Method. See this wiki page. Time Complexity is close to constant, given a positive integer.

```java
public boolean isPerfectSquare(int num) {
  if (num < 1) return false;
  for (int i = 1; num > 0; i += 2)
    num -= i;
  return num == 0;
}

public boolean isPerfectSquare(int num) {
  if (num < 1) return false;
  long left = 1, right = num;// long type to avoid 2147483647 case

  while (left <= right) {
    long mid = left + (right - left) / 2;
    long t = mid * mid;
    if (t > num) {
      right = mid - 1;
    } else if (t < num) {
      left = mid + 1;
    } else {
      return true;
    }
  }

  return false;
}

boolean isPerfectSquare(int num) {
  if (num < 1) return false;
  long t = num / 2;
  while (t * t > num) {
    t = (t + num / t) / 2;
  }
  return t * t == num;
}
```

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Solution 3

Just slightly modified my sqrt solutions. You can find some explanation there.

(Note I renamed the parameter to x because that's the name in the sqrt problem and I like it better.)

Java, C++, C, C#

```
    long r = x;
    while (r*r > x)
        r = (r + x/r) / 2;
    return r*r == x;
```

Python

```
    r = x
    while r*r > x:
        r = (r + x/r) / 2
    return r*r == x
```

Ruby

```
    r  = x
    r = (r + x/r) / 2 while r*r > x
    r*r == x
```

JavaScript

```
    r = x;
    while (r*r > x)
        r = ((r + x/r) / 2) | 0;
    return r*r == x;
```

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