



INPE CAP 385 Desenvolvimento de Frameworks
2º Período / 2016

MATLAB

xUnit Test Framework

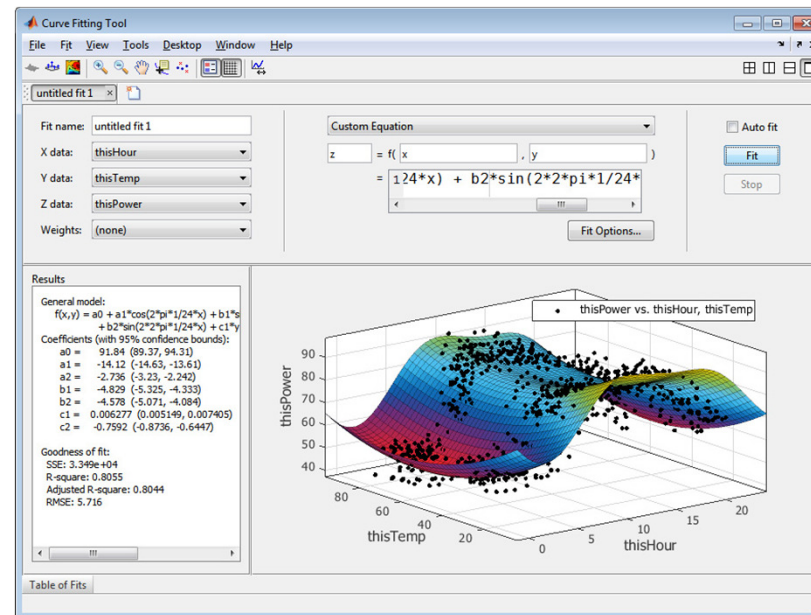
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MATLAB xUnit Test Framework

- Introdução
- Apresentação do Framework
- Exemplo
- Considerações

Introdução

- MATLAB (MATrix LABoratory)
 - Linguagem de programação computacional, usando como base o cálculo de matrizes e suas aplicações



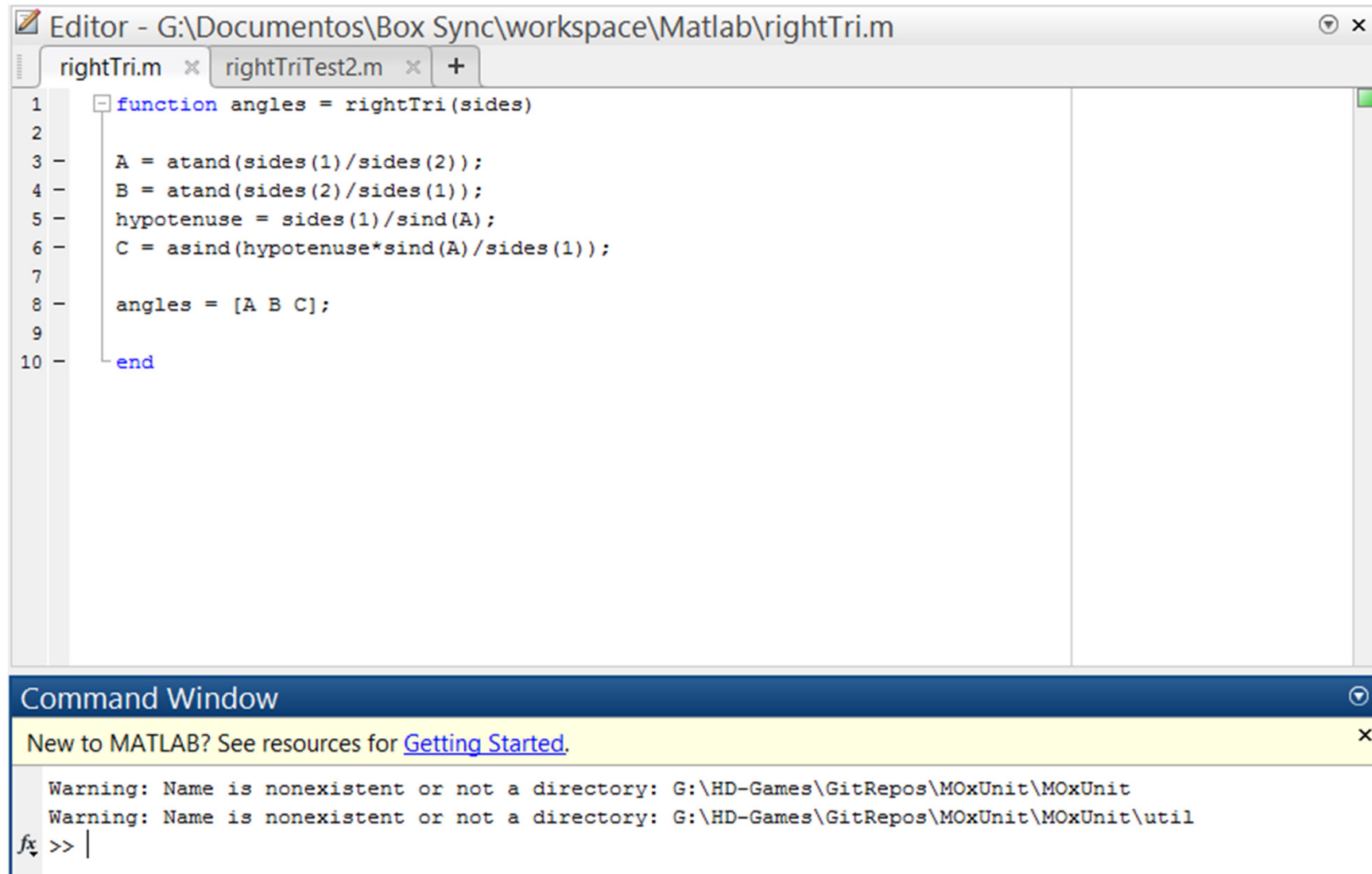
Apresentação do MATLAB xUnit Test Framework

- Testar a funcionalidade e desempenho do código MATLAB
 - Código de **testes de unidade** (teste de funções ou classes) como estratégia para atingir **qualidade** no desenvolvimento de software
 - Possibilita **guiar** o desenvolvimento e **monitorar a regressão da funcionalidade** do código, além de possibilitar a medição do **tempo de execução** do código e assim depurar o desempenho do código.
 - A partir da versão R2013a

Apresentação do MATLAB xUnit Test Framework

EXAMPLE

Exemplo - Função

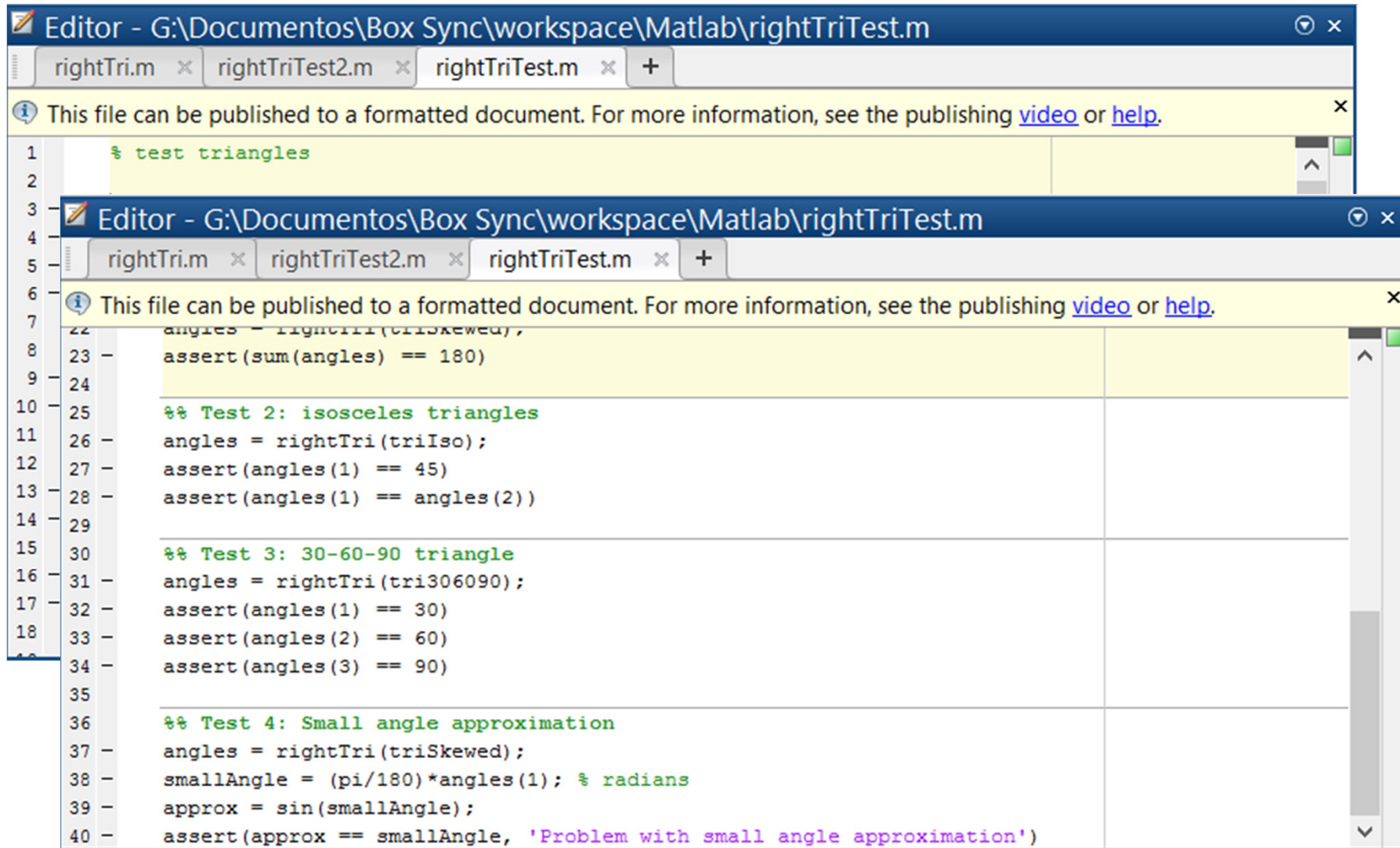


The image shows a MATLAB development environment. The top window is the 'Editor' with the file 'rightTri.m' open. It contains a function definition for 'rightTri' that takes 'sides' as input and returns 'angles'. The function calculates angles A and B using 'atand', finds the hypotenuse, and then calculates angle C using 'asind'. The bottom window is the 'Command Window', which displays a yellow message about MATLAB resources and two warning messages about nonexistent directories. The command prompt is currently empty, showing 'f>> |'.

```
Editor - G:\Documentos\Box Sync\workspace\Matlab\rightTri.m
rightTri.m x rightTriTest2.m x +
1 function angles = rightTri(sides)
2
3     A = atand(sides(1)/sides(2));
4     B = atand(sides(2)/sides(1));
5     hypotenuse = sides(1)/sind(A);
6     C = asind(hypotenuse*sind(A)/sides(1));
7
8     angles = [A B C];
9
10    end

Command Window
New to MATLAB? See resources for Getting Started.
Warning: Name is nonexistent or not a directory: G:\HD-Games\GitRepos\MOxUnit\MOxUnit
Warning: Name is nonexistent or not a directory: G:\HD-Games\GitRepos\MOxUnit\MOxUnit\util
f>> |
```

Exemplo – Função (Código Teste)



The image shows two overlapping MATLAB Editor windows. The top window displays the first line of code: `% test triangles`. The bottom window displays the rest of the code, which includes four tests for the `rightTri` function. Each test block starts with a comment `%% Test X: description`, followed by a call to `rightTri` to get angles, and then `assert` statements to verify the results. The tests cover a general case, isosceles triangles, a specific 30-60-90 triangle, and a small angle approximation.

```
1 % test triangles
2
3
4
5
6
7 %% Test 1: general case
8 angles = rightTri(triSkewed);
9 assert(sum(angles) == 180)
10
11 %% Test 2: isosceles triangles
12 angles = rightTri(triIso);
13 assert(angles(1) == 45)
14 assert(angles(1) == angles(2))
15
16 %% Test 3: 30-60-90 triangle
17 angles = rightTri(tri306090);
18 assert(angles(1) == 30)
19 assert(angles(2) == 60)
20 assert(angles(3) == 90)
21
22 %% Test 4: Small angle approximation
23 angles = rightTri(triSkewed);
24 smallAngle = (pi/180)*angles(1); % radians
25 approx = sin(smallAngle);
26 assert(approx == smallAngle, 'Problem with small angle approximation')
```

Exemplo – Função (Resultados)

```
Command Window
New to MATLAB? See resources for Getting Started.

>> result1 = runtests('rightTriTest');
Running rightTriTest
..
=====
Error occurred in rightTriTest/Test3_30_60_90Triangle and it did not run to completion.

-----
Error Details:
-----
Assertion failed.

=====
.
=====
Error occurred in rightTriTest/Test4_SmallAngleApproximation and it did not run to completion.

-----
Error Details:
-----
Problem with small angle approximation

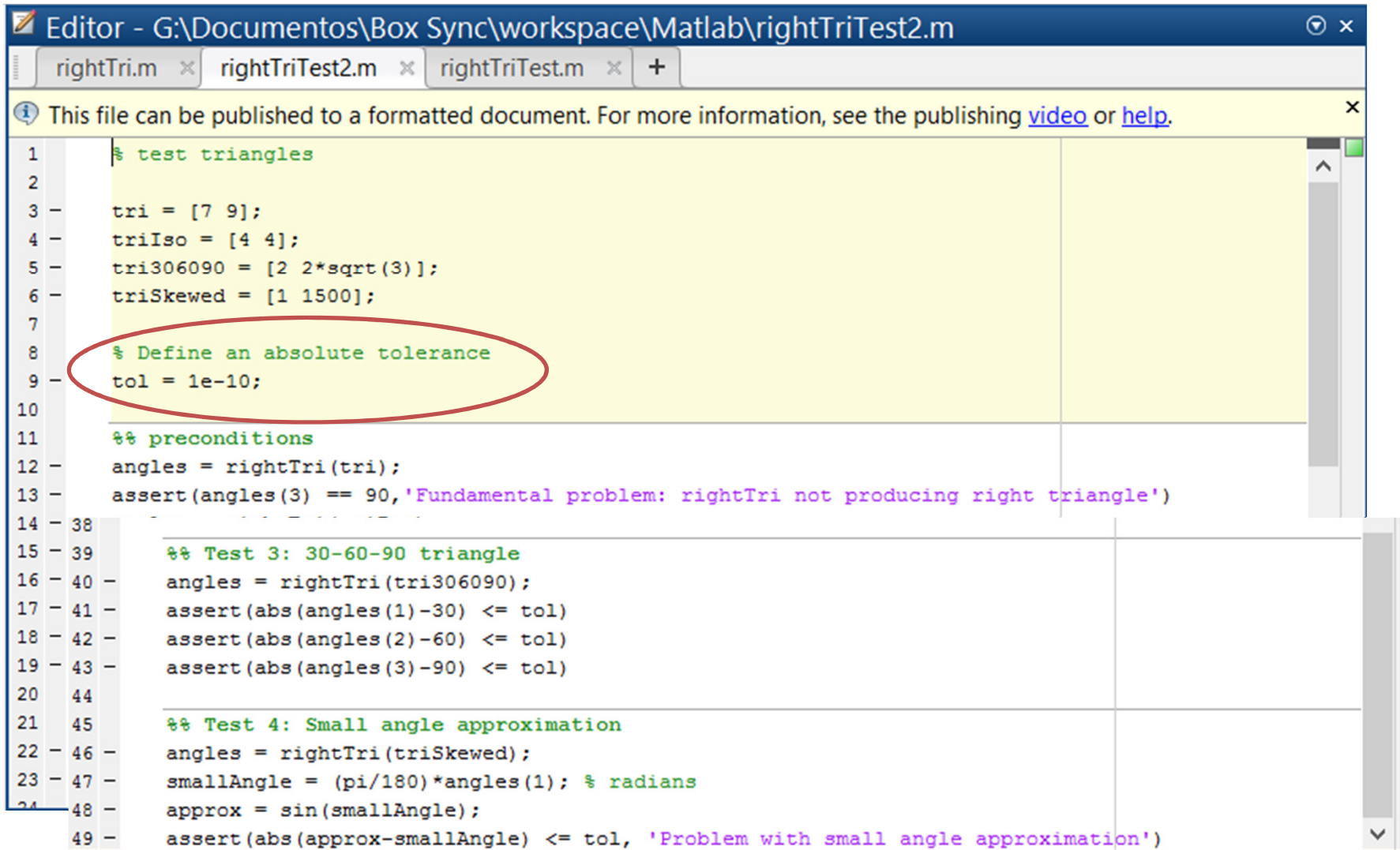
=====
.
Done rightTriTest

-----
Failure Summary:

Name                                     Failed  Incomplete  Reason(s)
-----
rightTriTest/Test3_30_60_90Triangle      X        X          Errored.
-----
rightTriTest/Test4_SmallAngleApproximation  X        X          Errored.
-----

fx >>
```


Exemplo – Função (Código Correção)



```
Editor - G:\Documentos\Box Sync\workspace\Matlab\rightTriTest2.m
rightTri.m x rightTriTest2.m x rightTriTest.m x +
This file can be published to a formatted document. For more information, see the publishing video or help.
1 % test triangles
2
3 - tri = [7 9];
4 - triIso = [4 4];
5 - tri306090 = [2 2*sqrt(3)];
6 - triSkewed = [1 1500];
7
8 % Define an absolute tolerance
9 tol = 1e-10;
10
11 %% preconditions
12 - angles = rightTri(tri);
13 - assert(angles(3) == 90, 'Fundamental problem: rightTri not producing right triangle')
14 - 38
15 - 39 %% Test 3: 30-60-90 triangle
16 - 40 - angles = rightTri(tri306090);
17 - 41 - assert(abs(angles(1)-30) <= tol)
18 - 42 - assert(abs(angles(2)-60) <= tol)
19 - 43 - assert(abs(angles(3)-90) <= tol)
20 - 44
21 - 45 %% Test 4: Small angle approximation
22 - 46 - angles = rightTri(triSkewed);
23 - 47 - smallAngle = (pi/180)*angles(1); % radians
24 - 48 - approx = sin(smallAngle);
25 - 49 - assert(abs(approx-smallAngle) <= tol, 'Problem with small angle approximation')
```

Exemplo – Função (Resultados Correção)

```
Command Window
New to MATLAB? See resources for Getting Started.

>> result2 = runtests('rightTriTest2')
Running rightTriTest2
.....
Done rightTriTest2

result2 =

1x5 TestResult array with properties:

    Name
    Passed
    Failed
    Incomplete
    Duration

Totals:
    5 Passed, 0 Failed, 0 Incomplete.
    0.023553 seconds testing time.

>> rt = table(result2)

rt =

      Name      Passed      Failed      Incomplete      Duration
-----
'rightTriTest2/preconditions'      true      false      false      0.007525
'rightTriTest2/Test1_SumOfAngles'    true      false      false      0.00407
'rightTriTest2/Test2_IsoscelesTriangles'    true      false      false      0.0039499
'rightTriTest2/Test3_30_60_90Triangle'    true      false      false      0.0039045
'rightTriTest2/Test4_SmallAngleApproximation'    true      false      false      0.0041034

fx >> |
```

Considerações

- Framework ?
 - runtests('test_suite')
 - Assertivas / Instrumentação
 - Resultados tabelados
 - Desempenho