

Fotorealistyczna Grafika Komputerowa

Matematyka wektorów

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Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

plane.Plane	3
ray.Ray	5
sphere.Sphere	6
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vector.Vec2	10
vector.Vec3	12

Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

plane.Plane	Documentation for a class Plane	3
ray.Ray	Documentation for a class Ray	5
sphere.Sphere	Documentation for a class Sphere	6
tests.Test	Documentation for a class Test	9
vector.Vec2	Documentation for a class Vec2	10
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Chapter 3

Class Documentation

3.1 plane.Plane Class Reference

Documentation for a class [Plane](#).

Public Member Functions

- `def __init__ (self, normal_vector, d)`
The constructor.
- `def __str__ (self)`
Function returning object values in string format.
- `def get_intersection (self, ray)`
Function returning intersection of a ray and a plane.

Public Attributes

- [normal_vector](#)
A class variable.
- [a](#)
A class variable.
- [b](#)
A class variable.
- [c](#)
A class variable.
- [d](#)
A class variable.

3.1.1 Detailed Description

Documentation for a class [Plane](#).

3.1.2 Member Function Documentation

3.1.2.1 get_intersection()

```
def plane.Plane.get_intersection (
    self,
    ray )
```

Function returning intersection of a ray and a plane.

3.1.3 Member Data Documentation

3.1.3.1 a

```
plane.Plane.a
```

A class variable.

Coordinate x of the normal vector.

3.1.3.2 b

```
plane.Plane.b
```

A class variable.

Coordinate y of the normal vector.

3.1.3.3 c

```
plane.Plane.c
```

A class variable.

Coordinate z of the normal vector.

3.1.3.4 d

```
plane.Plane.d
```

A class variable.

A shift, along the plane normal, from the center of the coordinate system.

3.1.3.5 normal_vector

```
plane.Plane.normal_vector
```

A class variable.

Normal vector.

The documentation for this class was generated from the following file:

- plane.py

3.2 ray.Ray Class Reference

Documentation for a class [Ray](#).

Public Member Functions

- `def __init__ (self, origin=Vec3(0, 0, 0), direction=Vec3(1, 1, 1), length=math.inf)`
The constructor.
- `def __str__ (self)`
Function returning object values in string format.
- `def is_point_on_ray (self, point)`
Function returning true if point is on ray and false otherwise.
- `def set_direction (self, new_direction)`
Function setting new direction vector.
- `def get_plane_intersection (self, plane)`
Function calling plane.get_intersection() method.
- `def get_sphere_intersections (self, sphere)`
Function calling sphere.get_ray_intersections() method.

Public Attributes

- `origin`
A class variable.
- `direction`
A class variable.
- `length`
A class variable.

3.2.1 Detailed Description

Documentation for a class [Ray](#).

3.2.2 Member Data Documentation

3.2.2.1 direction

`ray.Ray.direction`

A class variable.

Direction vector of a given ray.

3.2.2.2 length

`ray.Ray.length`

A class variable.

Length of a given ray.

3.2.2.3 origin

`ray.Ray.origin`

A class variable.

Origin vector of a given ray.

The documentation for this class was generated from the following file:

- `ray.py`

3.3 sphere.Sphere Class Reference

Documentation for a class [Sphere](#).

Public Member Functions

- `def __init__ (self, centre=Vec3(0, 0, 0), radius=math.inf)`
The constructor.
- `def get_centre (self)`
Function returning centre of the sphere.
- `def get_radius (self)`
Function returning radius of the sphere.
- `def surface_area (self)`
Function returning area of the sphere.
- `def get_volume (self)`
Function returning volume of the sphere.
- `def __str__ (self)`
Function returning object values in string format.
- `def get_ray_intersections (self, ray)`
Function returning intersection of a ray and a sphere.

Public Attributes

- [centre](#)
A class variable.
- [radius](#)
A class variable.
- [area](#)
A class variable.
- [volume](#)
A class variable.

3.3.1 Detailed Description

Documentation for a class [Sphere](#).

3.3.2 Member Function Documentation

3.3.2.1 `get_radius()`

```
def sphere.Sphere.get_radius (
    self )
```

Function returning radius of the sphere.

3.3.2.2 `get_ray_intersections()`

```
def sphere.Sphere.get_ray_intersections (
    self,
    ray )
```

Function returning intersection of a ray and a sphere.

3.3.2.3 `get_volume()`

```
def sphere.Sphere.get_volume (
    self )
```

Function returning volume of the sphere.

3.3.2.4 surface_area()

```
def sphere.Sphere.surface_area (
    self )
```

Function returning area of the sphere.

3.3.3 Member Data Documentation

3.3.3.1 area

```
sphere.Sphere.area
```

A class variable.

Area of a sphere.

3.3.3.2 centre

```
sphere.Sphere.centre
```

A class variable.

Centre of a sphere.

3.3.3.3 radius

```
sphere.Sphere.radius
```

A class variable.

Radius of a sphere.

3.3.3.4 volume

```
sphere.Sphere.volume
```

A class variable.

Volume of a sphere.

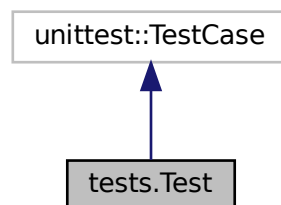
The documentation for this class was generated from the following file:

- sphere.py

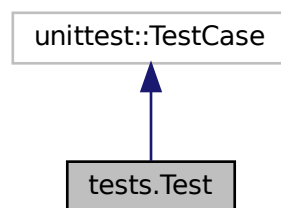
3.4 tests.Test Class Reference

Documentation for a class [Test](#).

Inheritance diagram for tests.Test:



Collaboration diagram for tests.Test:



Public Member Functions

- def **setUp** (self)
- def [test_add](#) (self)
Vector tests.
- def [test_sub](#) (self)
Vector tests.
- def [test_pos](#) (self)
Vector tests.
- def [test_neg](#) (self)
Vector tests.
- def [test_length](#) (self)
Vector tests.
- def [test__truediv__](#) (self)
Vector tests.

- def [test_mul](#) (self)
Vector tests.
- def [test_cross](#) (self)
Vector tests.
- def [test_point_on_line](#) (self)
Ray tests.
- def [test_plane_intersection](#) (self)
Plane tests.
- def [test_get_centre](#) (self)
Sphere tests.
- def [test_get_radius](#) (self)
Sphere tests.
- def [test_surface_area](#) (self)
Sphere tests.
- def [test_get_volume](#) (self)
Sphere tests.
- def [test_get_sphere_intersection](#) (self)
Sphere tests.

Public Attributes

- **v1**
- **v2**
- **v3**
- **v4**
- **v5**
- **v6**
- **v7**
- **r1**
- **r2**
- **r3**
- **r4**
- **p1**
- **p2**
- **s1**
- **s2**

3.4.1 Detailed Description

Documentation for a class [Test](#).

Unit tests.

The documentation for this class was generated from the following file:

- tests.py

3.5 vector.Vec2 Class Reference

Documentation for a class [Vec2](#).

Public Member Functions

- `def __init__ (self, x, y)`
The constructor.
- `def __add__ (self, other)`
Function returning sum of two vectors or sum of a vector and a scalar.
- `def __iadd__ (self, other)`
Function returning sum (In-place addition) of two vectors or sum of a vector and a scalar.
- `def __sub__ (self, other)`
Function returning difference of two vectors or difference of a vector and a scalar.
- `def __isub__ (self, other)`
Function returning difference (In-place Subtraction) of two vectors or difference of a vector and a scalar.
- `def __eq__ (self, other)`
Function "equal".
- `def __abs__ (self)`
Function returning absolute value of a given vector.
- `def __ne__ (self, other)`
Function "not equal".
- `def __neg__ (self)`
Function negating vector coordinates.
- `def __pos__ (self)`
Function for positive vector coordinates.
- `def __str__ (self)`
Function returning object values in string format.
- `def length (self)`
Function returning vector length.
- `def distance (self, other)`
Function returning the length of the displacement vector (distance between two points).
- `def __truediv__ (self, other)`
Function returning quotient of two vectors or quotient of a vector and a scalar.
- `def __itruediv__ (self, other)`
Function returning quotient (In-place Division) of two vectors or quotient of a vector and a scalar.
- `def __mul__ (self, other)`
Function returning dot product of two vectors or dot product of a vector and a scalar.
- `def __imul__ (self, other)`
Function returning dot product (In-place multiplication) of two vectors or dot product of a vector and a scalar.
- `def __rmul__ (self, other)`
Function returning cross product of two vectors.

Public Attributes

- `x`
A class variable.
- `y`
A class variable.

3.5.1 Detailed Description

Documentation for a class [Vec2](#).

3.5.2 Member Data Documentation

3.5.2.1 x

`vector.Vector2.x`

A class variable.

Coordinate x of a given vector.

3.5.2.2 y

`vector.Vector2.y`

A class variable.

Coordinate y of a given vector.

The documentation for this class was generated from the following file:

- `vector.py`

3.6 vector.Vector3 Class Reference

Documentation for a class [Vec3](#).

Public Member Functions

- `def __init__(self, x, y, z)`
The constructor.
- `def __add__(self, other)`
Function returning sum of two vectors or sum of a vector and a scalar.
- `def __iadd__(self, other)`
Function returning sum (In-place addition) of two vectors or sum of a vector and a scalar.
- `def __sub__(self, other)`
Function returning difference of two vectors or difference of a vector and a scalar.
- `def __isub__(self, other)`
Function returning difference (In-place Subtraction) of two vectors or difference of a vector and a scalar.
- `def __eq__(self, other)`
Function "equal".
- `def __abs__(self)`
Function returning absolute value of a given vector.
- `def __ne__(self, other)`
Function "not equal".
- `def __neg__(self)`

- Function negating vector coordinates.*

 - def `__pos__` (self)
- Function for positive vector coordinates.*

 - def `__str__` (self)
- Function returning object values in string format.*

 - def `length` (self)
- Function returning vector length.*

 - def `distance` (self, other)
- Function returning the length of the displacement vector (distance between two points).*

 - def `is_point_on_ray` (self, ray)
- Is point on ray wrapper.*

 - def `__truediv__` (self, other)
- Function returning quotient of two vectors or quotient of a vector and a scalar.*

 - def `__itruediv__` (self, other)
- Function returning quotient (In-place Division) of two vectors or quotient of a vector and a scalar.*

 - def `__mul__` (self, other)
- Function returning dot product of two vectors or dot product of a vector and a scalar.*

 - def `__imul__` (self, other)
- Function returning dot product (In-place multiplication) of two vectors or dot product of a vector and a scalar.*

 - def `__rmul__` (self, other)
- Function returning dot product (Reverse multiplication).*

 - def `cross` (self, other)
- Function returning cross product of two vectors.*

Public Attributes

- `x`
A class variable.
- `y`
A class variable.
- `z`
A class variable.

3.6.1 Detailed Description

Documentation for a class [Vec3](#).

3.6.2 Member Data Documentation

3.6.2.1 `x`

`vector.Vec3.x`

A class variable.

Coordinate x of a given vector.

3.6.2.2 y

`vector.Vec3.y`

A class variable.

Coordinate y of a given vector.

3.6.2.3 z

`vector.Vec3.z`

A class variable.

Coordinate z of a given vector.

The documentation for this class was generated from the following file:

- `vector.py`

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