

FUNCTION: ramamocktheta[getmockqs] - get q-expansion of mock theta function

CALLING SEQUENCE: getmockqs(func,m)

PARAMETERS: func - char corresponding to a mock theta function
m - integer (order of mock theta function)

GLOBAL VARIABLES:

SYNOPSIS:

EXAMPLES:

```
> with(ramamocktheta):
> with(qseries):
> f3q:=getmockqs(f,3):
> series(f3q,q,10);
      2      3      4      5      6      7      8      9      10
1 + q - 2 q + 3 q - 3 q + 3 q - 5 q + 7 q - 6 q + 6 q + O(q )

> qdegree(f3q);
      1001

> cf3:=n-> if type(n,integer) and n>=0 then coeff(f3q,q,n) else 0 fi:
> seq(cf3(125*n+99)+cf3(5*n+4),n=0..5);
      17500, -7237220, 680233240, -30719164585, 875359871775, -18035791352180
```

DISCUSSION:

We compute first few terms of the third order function $f(q)$

Let $c(n)$ be coefficient of q^n in $f(q)$.

It seems that

$$c(125n + 99) + c(5n + 4) \equiv 0 \pmod{5}$$

SEE ALSO:

FUNCTION: ramamocktheta[mockdesorder] - return list of mock theta functions of given order

CALLING SEQUENCE: mockdesorder(m)

PARAMETERS: m - integer (order of mock theta function)

GLOBAL VARIABLES:

SYNOPSIS:

EXAMPLES:

```
> with(ramamocktheta):
```

```
> mockdesorder(2):
```

There are 3 mock theta functions of order 2:

```
['A2', 'B2', 'mu2']
```

```
> mockdesorder(3):
```

There are 7 mock theta functions of order 3:

```
['f3', 'phi3', 'psi3', 'chi3', 'omega3', 'nu3', 'rho3']
```

```
> mockdesorder(5):
```

There are 12 mock theta functions of order 5:

```
['f05', 'f15', 'phi05', 'phi15', 'psi05', 'psi15', 'chi05', 'chi15', 'F05', 'F15', 'Psi05', 'Psi15']
```

```
> mockdesorder(6):
```

There are 9 mock theta functions of order 6:

```
['phi6', 'psi6', 'rho6', 'sigma6', 'lambda6', 'mu6', 'gamma6', 'phiminus6', 'psiminus6']
```

```
> mockdesorder(7):
```

There are 3 mock theta functions of order 7:

```
['F07', 'F17', 'F27']
```

```
> mockdesorder(8):
```

There are 8 mock theta functions of order 8:

```
['S08', 'S18', 'T08', 'T18', 'U08', 'U18', 'V08', 'V18']
```

```
> mockdesorder(10):
```

There are 4 mock theta functions of order 10:

```
['phi10', 'psi10', 'X10', 'chi10']> quit
```

DISCUSSION:

There are 7 mock functions of order 3.

They are $f(q)$, $\phi(q)$, $\psi(q)$, $\chi(q)$, $\omega(q)$, $\nu(q)$, $\rho(q)$

SEE ALSO:

FUNCTION: ramamocktheta[mockfuncdes] - description of a mock theta function

CALLING SEQUENCE: mockfuncdes(func,m)

PARAMETERS: func - char corresponds to a mock theta function
 m - integer (order of a mock theta)

GLOBAL VARIABLES:

SYNOPSIS:

EXAMPLES:

> with(ramamocktheta):

> mockfuncdes(f,3);

"f3":

$$\text{"f3"} = \frac{1}{\text{aqprod}(-q, q, 0)^2} + \left(\frac{\sum_{n=1}^{\infty} \frac{q^{n^2}}{\text{aqprod}(-q, q, n)^2}}{q} \right)$$

DISCUSSION:

The definition of the third order mock theta function

$$f(q) = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(-q, q)_{n^2}}$$

SEE ALSO:

FUNCTION: ramamocktheta[*mockqs*] - compute *q*-expansion of a given mock theta function

CALLING SEQUENCE: *mockqs*(*func*,*m*,*T*)

PARAMETERS: *func* - char corresponding to a mock theta function
m - integer (order of mock theta)
T - positive integer

GLOBAL VARIABLES:

SYNOPSIS: Computes *q*-expansion of given order *m* function up to q^T

EXAMPLES:

```
> with(ramamocktheta):
> with(qseries):
> mockqs(f,3,10);
      2      3      4      5      6      7      8      9      10      11
1 + q - 2 q + 3 q - 3 q + 3 q - 5 q + 7 q - 6 q + 6 q - 10 q + O(q )
```

DISCUSSION:

We computed the first 10 terms of $f(q)$ (third order function)

SEE ALSO:

`getmockqs`

FUNCTION: ramamocktheta[mockqtablemake] - update q-expansions of mock-theta functions in the package

CALLING SEQUENCE: mockqtablepres(LT,LT1)

PARAMETERS: LT - positive integer
 LT1 - positive integer

GLOBAL VARIABLES: _mockqtable, _mockqtablepres, _mockqtableinds

SYNOPSIS:

 Compute q-expansions of all functions in package

 Most functions are computed to q^{LT} (def with quad exponent)

EXAMPLES:

```
> with(ramamocktheta):  
> with(qseries):  
> ramamocktheta[mockqtablemake](1000,300);
```

DISCUSSION:

SEE ALSO:

 getmockqs, mockqs

FUNCTION: ramamocktheta[ramamockthetapversion] - package version

CALLING SEQUENCE: ramamockthetapversion()

PARAMETERS: -
-

GLOBAL VARIABLES:
SYNOPSIS:

EXAMPLES:

```
> with(ramamocktheta):
> ramamockthetapversion();
*****
*
* ramamocktheta package version 0.1
* Thu, Jul 26, 2018 5:15:11 PM
* This version tested on MAPLE 2017
*
* Please report any problems to fgarvan@ufl.edu
* NO Previous versions:
```

```
*****
DISCUSSION:
```

SEE ALSO:

