Rady - kriteria konvergence

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>
> restart:
  with(plots) :with(plottools):

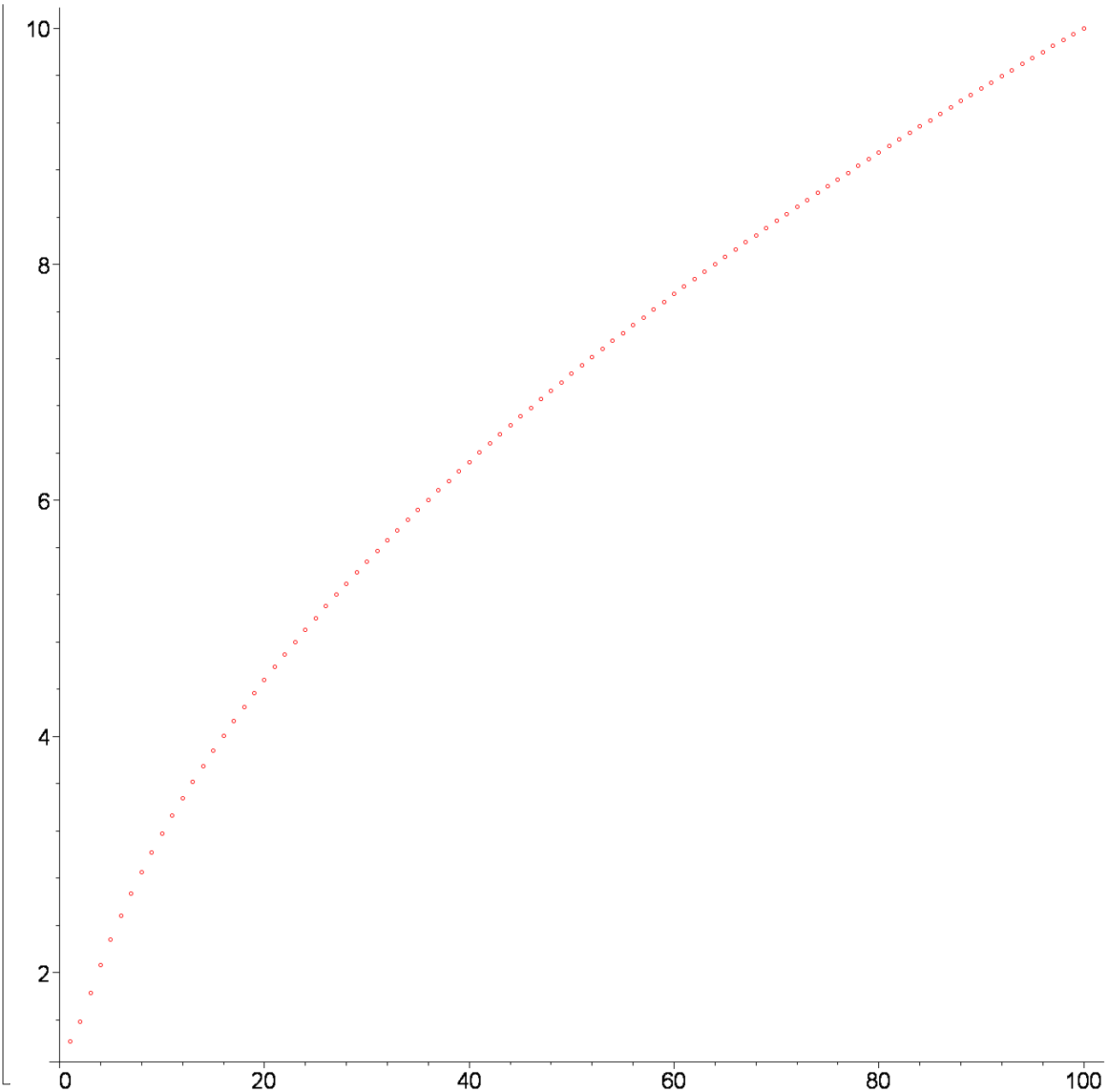
  rada:=sqrt(n+1/n):


  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  pnlimit:=limit(pn(n),n=infinity);
  if pnlimit<>0 then r:="NE" else
  podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
  odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
  (odmoc=1) then r:=int(pn(n),n=1..infinity) else if odmoc<1 or
  podil<1 then r="ANO" else r="NE" fi fi fi:
  Konverguje:=r;
  body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..100)]:
  display(body);
```

$$\sum_{n=1}^{\infty} \sqrt{n+\frac{1}{n}}$$

$$pnlimit := \infty$$

$$Konverguje := \text{"NE"}$$

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```
> restart:
  with(plots) :with(plottools):

  rada:=((-1)^(n+1))/(n*(n+1)):


  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  Soucet:=sum(pn(n),n=1..infinity):
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
```

```
podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
(odmoc=1) then r:=int(pn(n),n=1..infinity) else if odmoc<1 or
podil<1 then r:="ANO" else r:="NE" fi fi fi:
Konverguje:=r;
if r="ANO" then Soucet else Soucet:=infinity fi:
Soucet:=Soucet;
body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..10)]:
display(body);
```

$$\sum_{n=1}^{\infty} \frac{(-1)^{(n+1)}}{n\,(n+1)}$$

$$limita := 0$$

```
Error, cannot determine if this expression is true or false:
limit(((-1)^(n+1)/n/(n+1))^(1/n),n = infinity) < 1
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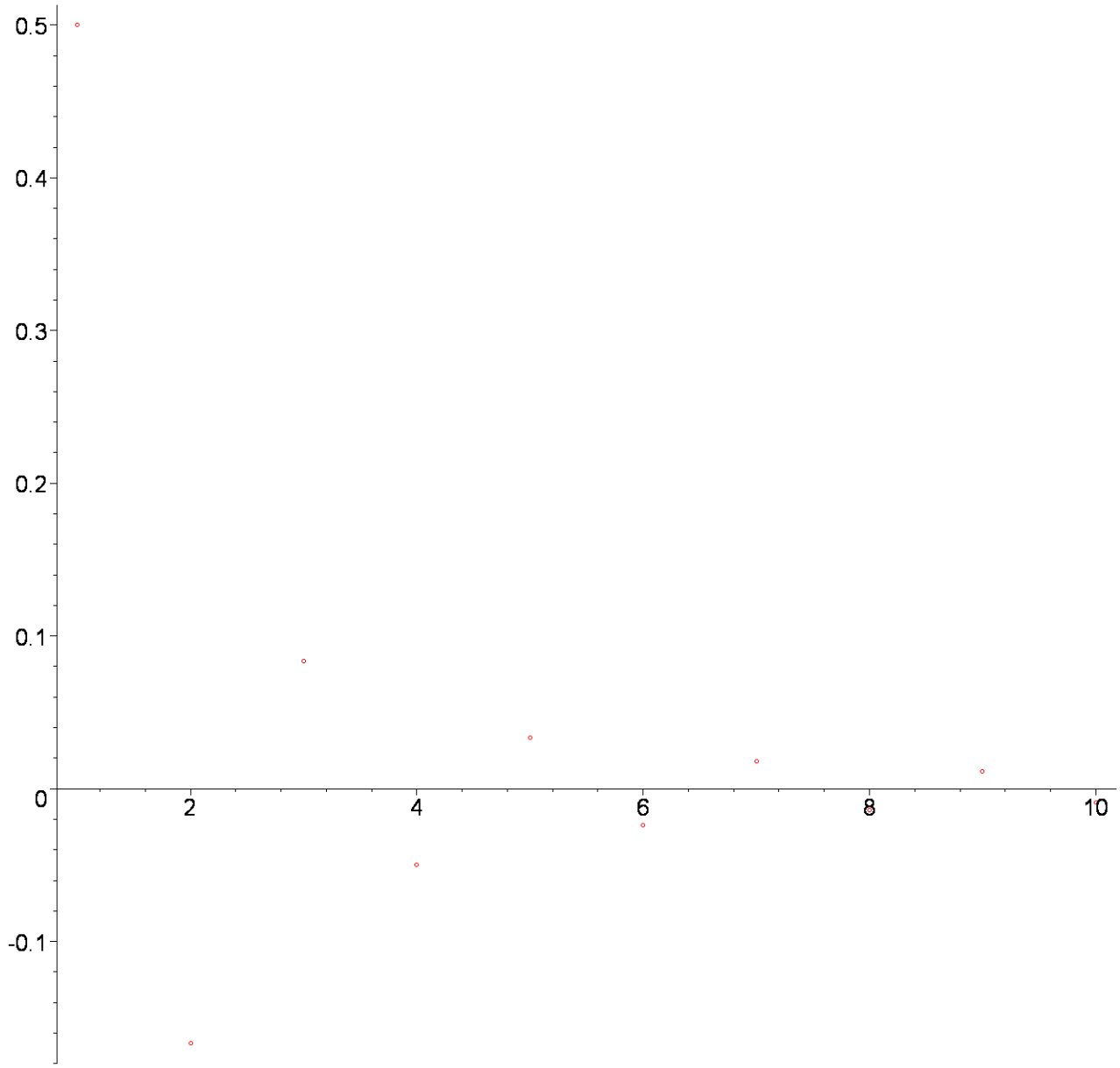
$$Konverguje := r$$

$$Soucet := \infty$$

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> restart:
  with(plots) :with(plottools):

  rada:=n^2/n!:


  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  Soucet:=sum(pn(n),n=1..infinity):
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
```

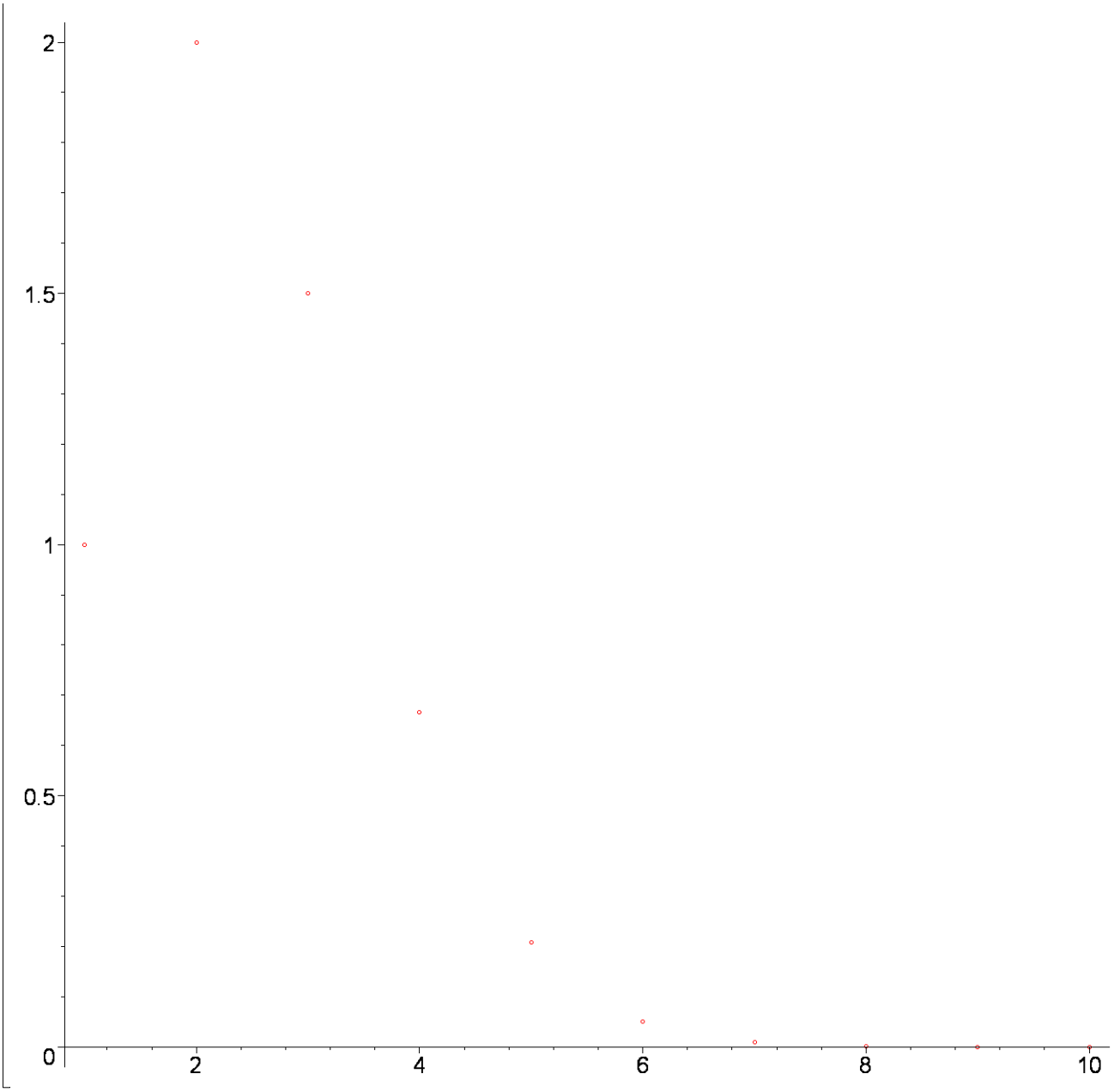
```
podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
(odmoc=1) then r:=int(pn(n),n=1..infinity) else if odmoc<1 or
podil<1 then r:="ANO" else r:="NE" fi fi fi:
Konverguje:=r;
if r="ANO" then Soucet else Soucet:=infinity fi:
Soucet:=Soucet;
body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..10)]:
display(body);
```

$$\sum_{n=1}^{\infty} \frac{n^2}{n!}$$

limita := 0

Konverguje := "ANO"

Soucet := 2 **e**

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> restart:
  with(plots) :with(plottools):

  rada:=(1/2^n+1/3^n):


  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  Soucet:=sum(pn(n),n=1..infinity):
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
```

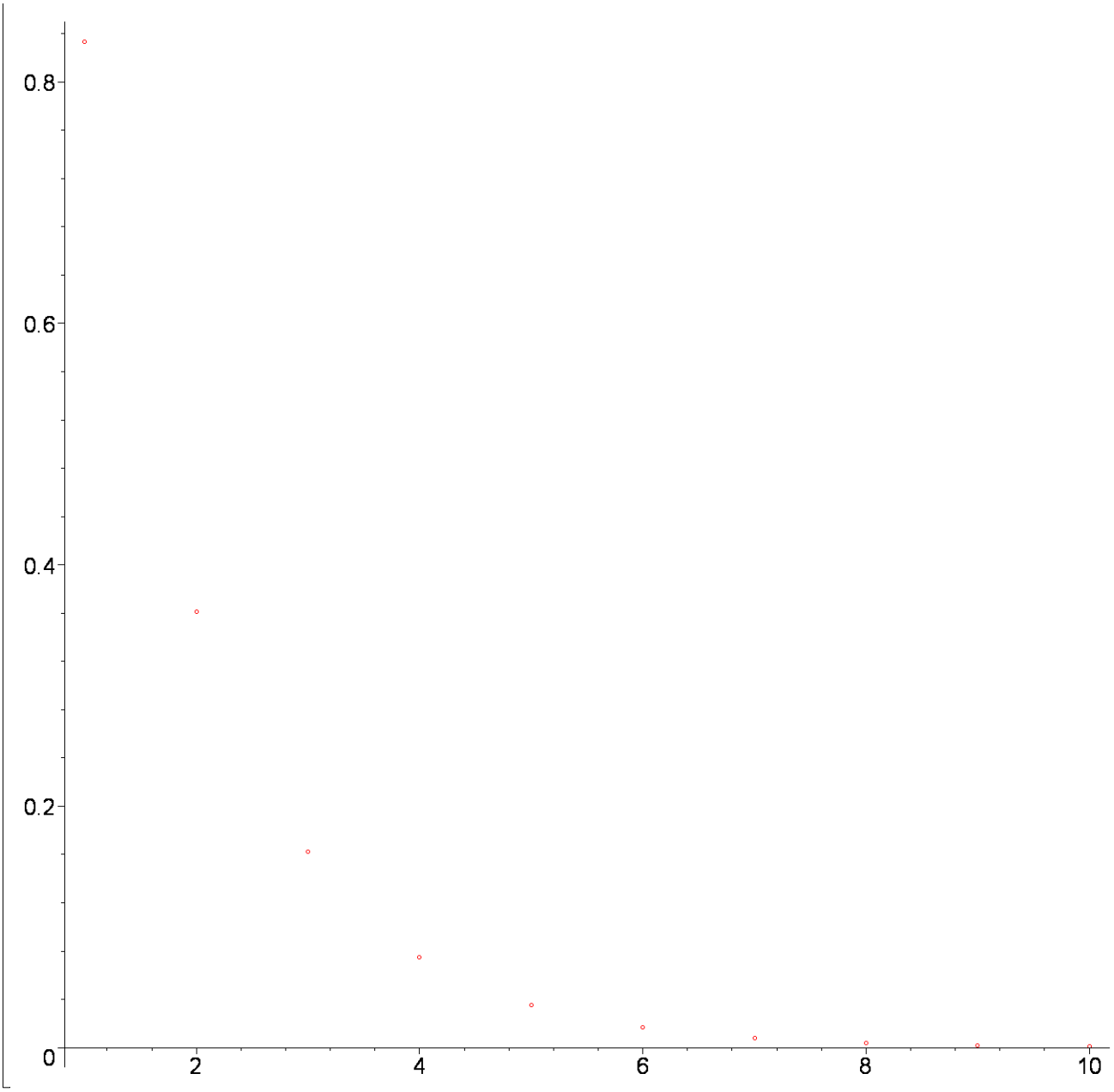
```
podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
(odmoc=1) then r:=int(pn(n),n=1..infinity) else if odmoc<1 or
podil<1 then r:="ANO" else r:="NE" fi fi fi:
Konverguje:=r;
if r="ANO" then Soucet else Soucet:=infinity fi:
Soucet:=Soucet;
body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..10)]:
display(body);
```

$$\sum_{n=1}^{\infty}\left(\frac{1}{2^n}+\frac{1}{3^n}\right)$$

$$limita := 0$$

$$Konverguje := \text{"ANO"}$$

$$Soucet := \frac{3}{2}$$

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> restart:
  with(plots) :with(plottools):

  rada:=(1+n)/(1+n^2):

  r:="?":
  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  Soucet:=sum(pn(n),n=1..infinity);
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
  podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
```

```
odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
(odmoc=1) then integ:=int(pn(n),n=1..infinity) else if odmoc<1
or podil<1 then r:="ANO" else r:="NE" fi fi fi:
if r="?" then IntegralKriter:=integ; else Konverguje:=r fi;

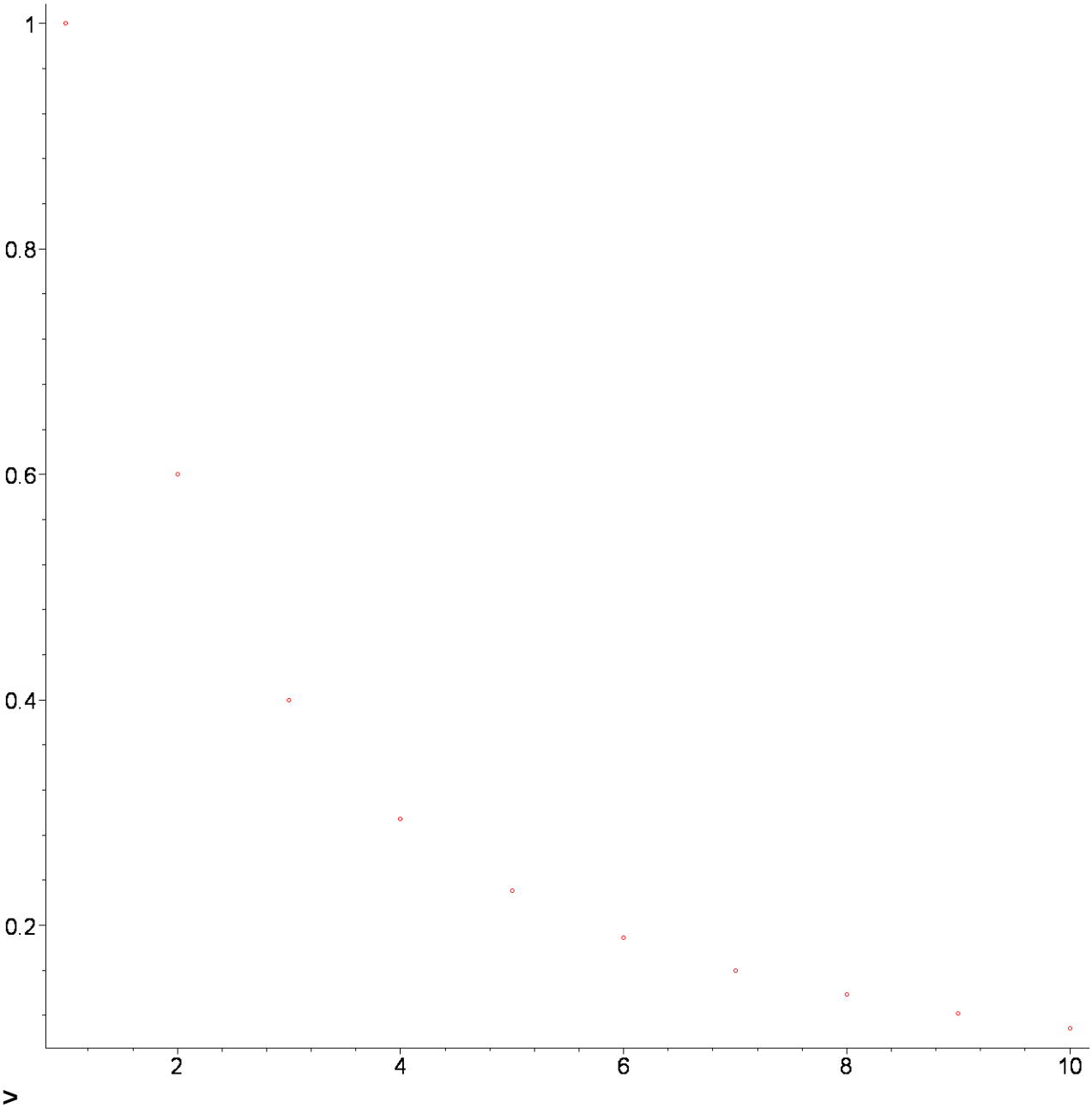
body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..10)]:
display(body);
```

$$\sum_{n=1}^{\infty} \frac{1+n}{1+n^2}$$

$$Soucet := \infty$$

$$limita := 0$$

$$IntegralKriter := \infty$$



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> restart:
  with(plots) :with(plottools):

  rada:=(n+7)!/(7^n*n!):

  r:="?":
  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  Soucet:=sum(pn(n),n=1..infinity);
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
  podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
  odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
  (odmoc=1) then integ:=int(pn(n),n=1..infinity) else if odmoc<1
  or podil<1 then r:="ANO" else r:="NE" fi fi fi:
  if r="?" then IntegralKriter:=integ; else Konverguje:=r fi;

  body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..10)]:
  display(body);
```
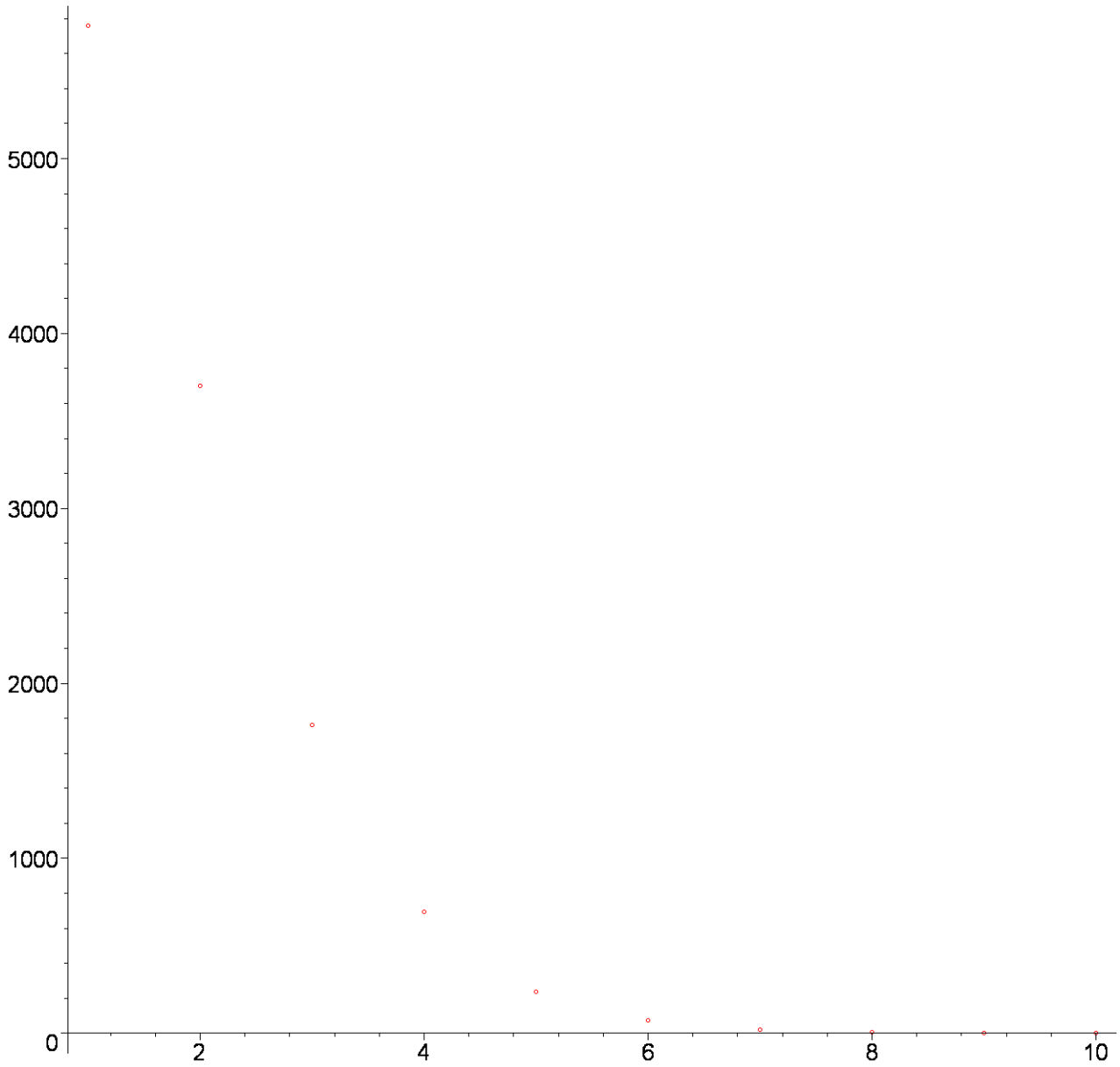

$$\sum_{n=1}^{\infty} \frac{(n+7)!}{7^n\, n!}$$

$$Soucet := \frac{142981475}{11664}$$

$$limita := 0$$

$$Konverguje := \text{"ANO"}$$

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```
> restart:
  with(plots) :with(plottools):

  rada:=(3^n)/n^3:

  r:="?":
  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  Soucet:=sum(pn(n),n=1..infinity);
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
```

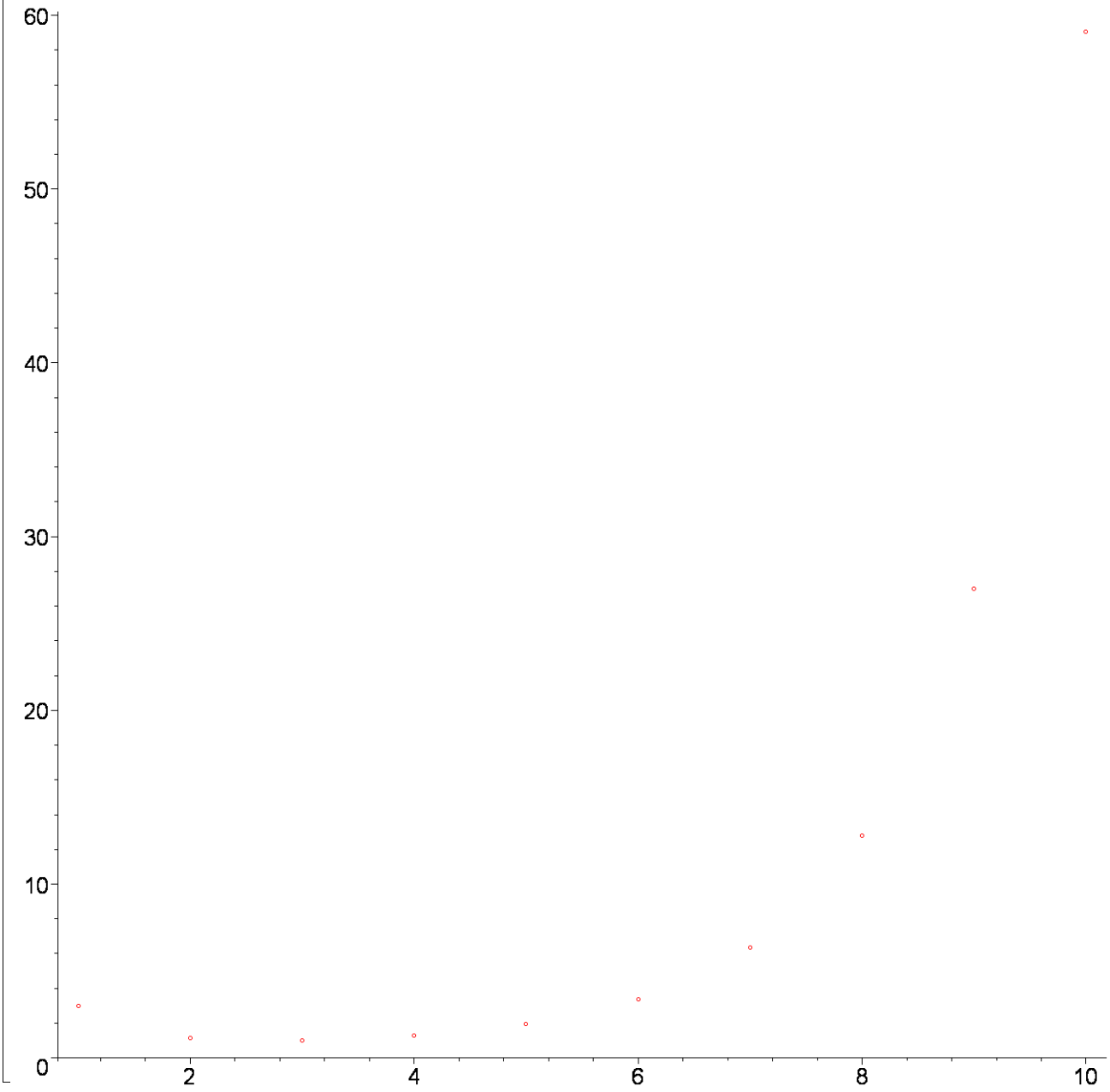
```
podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
(odmoc=1) then integ:=int(pn(n),n=1..infinity) else if odmoc<1
or podil<1 then r:="ANO" else r:="NE" fi fi fi:
if r="?" then IntegralKriter:=integ; else Konverguje:=r fi;

body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..10)]:
display(body);
```

$$\sum_{n=1}^{\infty} \frac{3^n}{n^3}$$

Soucet := polylog(3, 3)

limita := ∞

Konverguje := "NE"



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> restart:
  with(plots) :with(plottools):

  rada:=n^n/(2*n)!:

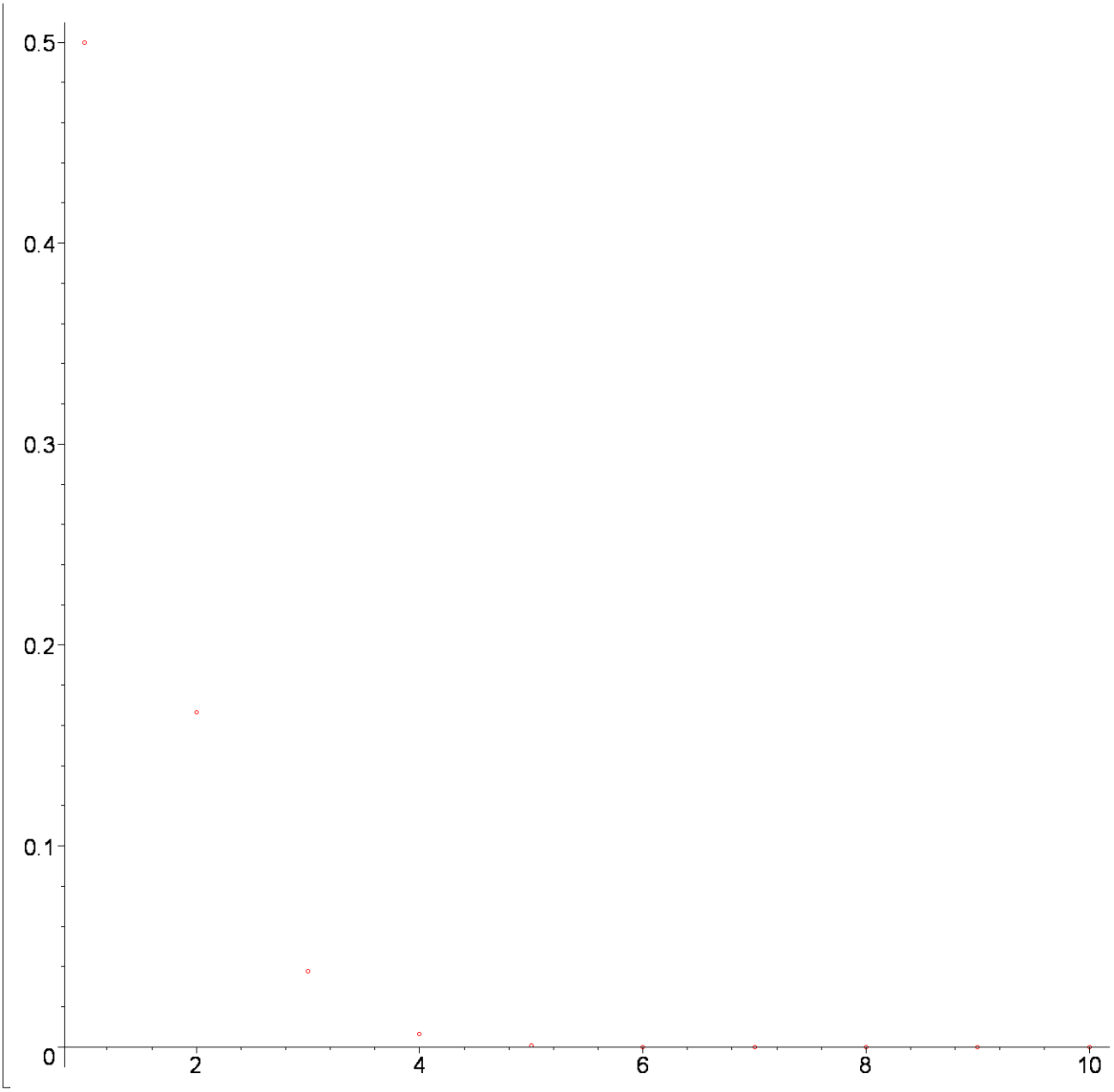
  r:="?":
  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
  podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
  odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
  (odmoc=1) then integ:=int(pn(n),n=1..infinity) else if odmoc<1
  or podil<1 then r:="ANO" else r:="NE" fi fi fi:
  if r="?" then IntegralKriter:=integ; else Konverguje:=r fi;

  body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=1..10)]:
  display(body);
```

$$\sum_{n=1}^{\infty} \frac{n^n}{(2\,n)!}$$

$$limita := 0$$

$$Konverguje := \text{"ANO"}$$

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> restart:
  with(plots) :with(plottools):

  rada:=1/n*(sqrt(n+1)-sqrt(n-1)):

  r:="?":
  pn:=unapply(rada,n):
  Sum(pn(n),n=1..infinity);
  limita:=limit(pn(n),n=infinity);
  if limita<>0 then r:="NE" else
  podil:=limit(abs(pn(n+1)/pn(n)),n=infinity):
```

```
odmoc:=limit((pn(n))^(1/n),n=infinity): if (podil=1) and
(odmoc=1) then integ:=int(pn(n),n=1..infinity) else if odmoc<1
or podil<1 then r:="ANO" else r:="NE" fi fi fi:
if r="?" then IntegralKriter:=integ; else Konverguje:=r fi;

body:=[seq(point([n,pn(n)],color=red,symbol=circle),n=2..15)]:
display(body);
```

$$\sum_{n=1}^{\infty} \frac{\sqrt{n+1}-\sqrt{n-1}}{n}$$

$$limita := 0$$

$$IntegralKriter := -\ln(\sqrt{2}-1) - 2\sqrt{2} + \ln(\sqrt{2}+1) + \pi$$