%e^(atan2(0,n)*t) list all alternative ways of writing tis give argument form of this

Let's break down the expression you provided and re-express it in various equivalent or alternative forms, including in **argument (polar) form**.

Original expression:

Here:

- atan2(0, n) gives the **angle** θ between the positive x-axis and the vector (n, 0).
- Since the y-coordinate is 0, this essentially evaluates to:

$$atan2(0, n) = \begin{cases} 0 & \text{if } n > 0 \\ \pi & \text{if } n < 0 \\ \text{undefined (or 0 by convention)} & \text{if } n = 0 \end{cases}$$

Then this result is multiplied by t_i and exponentiated with base e.

Rewriting in Equivalent Forms

Case 1: n > 0

$$e^{\operatorname{atan2}(0,n)t} = e^{0 \cdot t} = e^0 = 1$$

Case 2: n < 0

$$e^{\operatorname{atan2}(0,n)t} = e^{\pi t}$$

Case 3: n = 0

atan2(0,0) is often defined as $0 \Rightarrow e^0 = 1$

igotimes Polar (Argument) Form of $e^{i heta}$

Euler's Formula:

$$e^{i\theta} = \cos(\theta) + i\sin(\theta)$$

So if we want to write your expression in **complex exponential (polar/argument) form**, we can reinterpret $\theta = \operatorname{atan2}(0, n) \cdot t$, assuming it appears as an **imaginary exponent**:

Complex Form:

$$e^{i \cdot \operatorname{atan2}(0,n) \cdot t} \implies \cos(\theta) + i \sin(\theta), \quad \text{with } \theta = \operatorname{atan2}(0,n) \cdot t$$

So, in **argument form**, this is:

$$\arg\left(e^{i\cdot \operatorname{atan2}(0,n)t}\right) = \operatorname{atan2}(0,n)t$$

Summary of Alternative Forms

1. Real exponential (your original):

$$e^{\operatorname{atan2}(0,n)t}$$

2. Piecewise expression (real case):

$$= \begin{cases} 1 & \text{if } n \ge 0 \\ e^{\pi t} & \text{if } n < 0 \end{cases}$$

3. Complex exponential form (polar form):

$$e^{i \cdot \operatorname{atan2}(0,n) \cdot t} = \cos(\theta) + i \sin(\theta), \quad \theta = \operatorname{atan2}(0,n) \cdot t$$

4. Argument:

$$\arg = \operatorname{atan2}(0, n) \cdot t$$

Let me know if you want the complex version plotted on the unit circle or applied to a specific value of n or t.



%e^(atan2(0,n)*t) list all alternative ways of writing tis yes write as piece wise polar rectangular also

Great! Let's break down all alternative forms of the expression:

$$e^{\operatorname{atan2}(0,n)\cdot t}$$

in piecewise, polar, and rectangular (Cartesian) forms.

♦ Step 1: Understand atan2(0, n)

The function atan2(0, n) returns the angle (in radians) between the x-axis and the point (n, 0):

$$atan2(0, n) = \begin{cases} 0 & \text{if } n > 0 \\ \pi & \text{if } n < 0 \\ 0 \text{ (by convention)} & \text{if } n = 0 \end{cases}$$

This is **not complex** unless you explicitly include i. So currently this is a **real exponential**.

1. Piecewise Real Expression:

$$e^{\operatorname{atan2}(0,n)\cdot t} = \begin{cases} e^0 = 1 & \text{if } n \ge 0\\ e^{\pi t} & \text{if } n < 0 \end{cases}$$

2. Polar Form (Complex) — If we assume a complex exponential form like:

 $e^{i \cdot \operatorname{atan2}(0,n) \cdot t}$

Then it becomes:

$$= \cos(\theta) + i\sin(\theta)$$
, with $\theta = \tan 2(0, n) \cdot t$

So in **polar form** (magnitude-angle form):

Polar (complex exponential):

$$e^{i\theta}$$
, $\theta = atan2(0, n) \cdot t$

With specific values:

• If
$$n > 0$$
: $\theta = 0 \Rightarrow e^{i \cdot 0} = 1$

• If
$$n < 0$$
: $\theta = \pi t \Rightarrow e^{i\pi t}$

• If
$$n = 0$$
: $\theta = 0 \Rightarrow e^{i \cdot 0} = 1$

3. Rectangular Form (Cartesian)

If we are interpreting it as complex (i.e., $e^{i \cdot \theta}$), then:

$$e^{i \cdot \operatorname{atan2}(0,n) \cdot t} = \cos(\theta) + i \sin(\theta)$$

With $\theta = \text{atan2}(0, n) \cdot t$, this gives:

$$\cos(\operatorname{atan2}(0,n) \cdot t) + i\sin(\operatorname{atan2}(0,n) \cdot t)$$

Specific cases:

• If
$$n > 0$$
:

$$\cos(0) + i\sin(0) = 1 + 0i = 1$$

• If n < 0:

$$\cos(\pi t) + i\sin(\pi t)$$

Example: if t = 1, this becomes -1 + 0i

• If n = 0: same as n > 0, yields 1.

4. Summary Table

Condition	Real (Original)	Polar Form	Rectangular (Cartesian)
$n \ge 0$	$e^0 = 1$	$e^{i\cdot 0}=1$	$\cos(0) + i\sin(0) = 1$
<i>n</i> < 0	$e^{\pi t}$	$e^{i\cdot \pi t}$	$\cos(\pi t) + i\sin(\pi t)$
n = 0	$e^0 = 1$	$e^{i\cdot 0}=1$	$\cos(0) + i\sin(0) = 1$

Let me know if you want a graph or animation of how the complex form rotates on the unit circle as t changes!



 $sum((%e^{(n)*t)*cos(log(abs(n))*t+atan2(0,n)/2))/s$ qrt(abs(n)),n,1,a) list all alternative ways of writing tis yes write as piece wise polar rectangular also

Let's break down the expression you provided:

Original Expression:

$$\sum_{n=1}^{a} \left(\frac{e^{\operatorname{atan2}(0,n)\cdot t} \cdot \cos\left(\log(|n|\right) \cdot t + \frac{\operatorname{atan2}(0,n)}{2}\right)}{\sqrt{|n|}} \right)$$

This is a real-valued series, though it involves angles and logs, and we can write it in different forms: piecewise, polar, and rectangular (complex).



Step 1: Simplify atan2(0, n)

As before:

atan2(0, n) =
$$\begin{cases} 0 & \text{if } n > 0 \\ \pi & \text{if } n < 0 \end{cases}$$

But since $n \in [1, a]$, we know n > 0. So:

$$atan2(0, n) = 0 \Rightarrow e^{atan2(0, n) \cdot t} = e^0 = 1 \Rightarrow \frac{atan2(0, n)}{2} = 0$$

So the entire sum becomes:

\checkmark Simplified Real Expression (for positive n)

$$\sum_{n=1}^{a} \left(\frac{\cos(\log(n) \cdot t)}{\sqrt{n}} \right)$$

\checkmark 1. **Piecewise Form** (handling general $n \in \mathbb{Z} \setminus \{0\}$):

If we wanted to define this **for any integer** n = 0 (not just $n \ge 0$), then we need a piecewise treatment:

Full General Piecewise Form:

$$\sum_{n=1}^{a} \begin{cases} \frac{\cos(\log(n)t)}{\sqrt{n}} & n > 0\\ \frac{e^{\pi t} \cdot \cos(\log(|n|)t + \frac{\pi}{2})}{\sqrt{|n|}} & n < 0 \end{cases}$$

Why:

- $atan2(0, n) = \pi \text{ for } n < 0$
- So $e^{\operatorname{atan2}(0,n)\cdot t} = e^{\pi t}$
- And the phase shift becomes $\frac{\pi}{2}$

2. Polar/Complex Form

We can repackage the cosine using Euler's formula:

$$\cos(\phi) = \Re\left(e^{i\phi}\right)$$

Let's denote:

•
$$\theta_n = \log(|n|) \cdot t + \frac{\operatorname{atan2}(0,n)}{2}$$

$$\bullet \quad A_n = \frac{e^{\operatorname{atan2}(0,n) \cdot t}}{\sqrt{|n|}}$$

Then:

$$\sum_{n=1}^{a} A_n \cdot \Re(e^{i\theta_n}) = \Re\left(\sum_{n=1}^{a} A_n e^{i\theta_n}\right)$$

So in full polar form:

$$\Re\left(\sum_{n=1}^{a} \frac{e^{\operatorname{atan2}(0,n)\cdot t} \cdot e^{i\left(\log(|n|)t + \frac{\operatorname{atan2}(0,n)}{2}\right)}}{\sqrt{|n|}}\right)$$

Combine exponents:

$$=\Re\left(\sum_{n=1}^{a}\frac{e^{\operatorname{atan2}(0,n)\cdot t+i\log(|n|)t+i\cdot\frac{\operatorname{atan2}(0,n)}{2}}}{\sqrt{|n|}}\right)$$

✓

3. Rectangular (Complex) Form

Let's convert the cosine directly:

$$\cos(\phi) = \frac{e^{i\phi} + e^{-i\phi}}{2}$$

So the original expression becomes:

$$\sum_{n=1}^{a} \frac{e^{\operatorname{atan2}(0,n) \cdot t}}{\sqrt{|n|}} \cdot \frac{e^{i(\log(|n|)t + \frac{\operatorname{atan2}(0,n)}{2})} + e^{-i(\log(|n|)t + \frac{\operatorname{atan2}(0,n)}{2})}}{2}$$

Which gives:

$$= \sum_{n=1}^{a} \frac{e^{\operatorname{atan2}(0,n)t}}{2\sqrt{|n|}} \left(e^{i(\log(|n|)t + \frac{\operatorname{atan2}(0,n)}{2})} + e^{-i(\log(|n|)t + \frac{\operatorname{atan2}(0,n)}{2})} \right)$$

This is fully in rectangular complex exponential form.

Summary Table

Form	Expression
Simplified Real (for $n > 0$)	$\sum_{n=1}^{a} \frac{\cos(\log(n)t)}{\sqrt{n}}$
Piecewise	$ \label{local_nequality} $$ \sum_{n > 0 \ frac_e^{\pi t} \cos(\log(n)t)} $$ \operatorname{sqrt_n} & n > 0 \ frac_e^{\pi t} \cos(\log(n)t) $$ $$$
Polar/Argument Form	$ \label{left(sum_{n=1}^{a} \frac{e^{\operatorname{net}(\sum_{n=1}^{a} \frac{e^{\infty}}{e^{\infty}})}{(0,n)t} e^{i\left(\log(e^{\infty}\right)} } $
Rectangular (Euler cosine)	lem:lem:lem:lem:lem:lem:lem:lem:lem:lem:

Would you like this sum visualized or written in LaTeX for plotting?



list all alternative ways of writing tis yes write as piece wise polar rectangular also sum((%e^(atan2(0,n)*t)*cos(log(abs(n))*t+atan2(0,n)/2))/s qrt(abs(n)),n,1,a) in wx maxima format

Certainly! Let's walk through all alternative forms of your expression in piecewise, polar, and rectangular formats, and write each version using wxMaxima syntax.

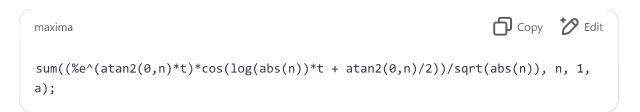
Original Expression

In plain math notation:

$$\sum_{n=1}^{a} \left(\frac{e^{\operatorname{atan2}(0,n)\cdot t} \cdot \cos\left(\log(|n|\right) \cdot t + \frac{\operatorname{atan2}(0,n)}{2}\right)}{\sqrt{|n|}} \right)$$



wxMaxima Syntax Version (Original)



This is correct for the full general form over positive integers.

1. Simplified (Piecewise) Form for n > 0

Since for n > 0, atan 2(0, n) = 0, so the expression simplifies to:

$$\sum_{n=1}^{a} \frac{\cos(\log(n) \cdot t)}{\sqrt{n}}$$

wxMaxima version:

2. Full Piecewise Form (extend to negative n if needed)

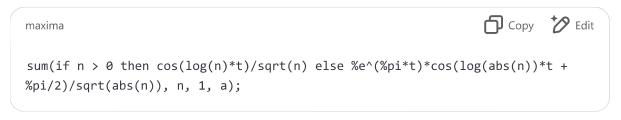
If n can be negative (i.e. hypothetical extension), then:

atan2(0, n) =
$$\begin{cases} 0 & n > 0 \\ \pi & n < 0 \end{cases}$$

So the full expression becomes:

$$\sum_{n=1}^{a} \begin{cases} \frac{\cos(\log(n)t)}{\sqrt{n}} & n > 0\\ \frac{e^{\pi t} \cdot \cos(\log(|n|)t + \pi/2)}{\sqrt{|n|}} & n < 0 \end{cases}$$

wxMaxima version (manual piecewise):



3. Polar Form

Use Euler's identity: $\cos(\phi) = \Re(e^{i\phi})$

So expression becomes:

$$\sum_{n=1}^{a} \Re\left(\frac{e^{\operatorname{atan2}(0,n)\cdot t} \cdot e^{i(\log(|n|)\cdot t + \operatorname{atan2}(0,n)/2)}}{\sqrt{|n|}}\right)$$

wxMaxima version:

4. Rectangular (Euler Cosine Expansion)

Using:

$$\cos(\phi) = \frac{e^{i\phi} + e^{-i\phi}}{2}$$

So the expression becomes:

$$\sum_{n=1}^{a} \frac{e^{\operatorname{atan2}(0,n)t}}{2\sqrt{|n|}} \left(e^{i\phi} + e^{-i\phi} \right), \quad \phi = \log(|n|)t + \frac{\operatorname{atan2}(0,n)}{2}$$

wxMaxima version:

```
maxima Copy Copy Copy Stdit

sum((%e^(atan2(0,n)*t) / (2*sqrt(abs(n))) * (%e^(%i*(log(abs(n))*t + atan2(0,n)/2)) + %e^(-%i*(log(abs(n))*t + atan2(0,n)/2)))), n, 1, a);
```

Summary of wxMaxima Forms

Form	wxMaxima Expression	
Original	<pre>sum((%e^(atan2(0,n)*t)*cos(log(abs(n))*t + atan2(0,n)/2))/sqrt(abs(n)), n, 1, a);</pre>	
Simplified (n > 0)	<pre>sum(cos(log(n)*t)/sqrt(n), n, 1, a);</pre>	
Piecewise	<pre>sum(if n > 0 then cos(log(n)*t)/sqrt(n) else %e^(%pi*t)*cos(log(abs(n))*t + %pi/2)/sqrt(abs(n)), n, 1, a);</pre>	
Polar (Real part of exponential)	realpart(sum((%e^(atan2(0,n)*t) * %e^(%i*(log(abs(n))*t + atan2(0,n)/2)))/sqrt(abs(n)), n, 1, a));	
Rectangular (Euler form)	<pre>sum((%e^(atan2(0,n)*t) / (2*sqrt(abs(n))) * (%e^(%i* (log(abs(n))*t + atan2(0,n)/2)) + %e^(-%i*(log(abs(n))*t + atan2(0,n)/2)))), n, 1, a);</pre>	

Would you like help visualizing this or evaluating it for a specific value of a and t?



 $sum((%e^{(n)*t)*cos(log(abs(n))*t+atan2(0,n)/2))/s$ grt(abs(n)),n,1,a) list all alternative ways of writing tis yes write as piece wise polar rectangular also in wx maxima format

Great — you're looking for all alternative forms (piecewise, polar, and rectangular) of this expression:

Original Expression:

$$\sum_{n=1}^{a} \left(\frac{e^{\operatorname{atan2}(0,n)\cdot t} \cdot \cos\left(\log(|n|)\cdot t + \frac{\operatorname{atan2}(0,n)}{2}\right)}{\sqrt{|n|}} \right)$$

We'll rewrite this expression in wxMaxima format for:

- 1. **Original expression**
- 2. **Piecewise form**
- 3. Polar form (complex exponential form with realpart)
- 4. Rectangular (Euler expansion) form

1. Original Expression — in wxMaxima

Copy Dedit maxima $sum((%e^{(atan2(0,n)*t)} * cos(log(abs(n))*t + atan2(0,n)/2)) / sqrt(abs(n)), n,$

1, a);

2. Piecewise Form — basedon atan2(0,n) behavior

Recall:

atan2(0, n) =
$$\begin{cases} 0 & \text{if } n > 0 \\ \pi & \text{if } n < 0 \end{cases}$$

If you're only summing over n > 0, the expression simplifies:

Full piecewise (allowing for n < 0, hypothetically):

3. Polar Form (using realpart and Euler's formula)

$$\cos(\phi) = \Re(e^{i\phi})$$

So the original becomes:

$$\Re\left(\sum_{n=1}^{a} \frac{e^{\operatorname{atan2}(0,n)\cdot t} \cdot e^{i(\log(|n|)\cdot t + \frac{\operatorname{atan2}(0,n)}{2})}}{\sqrt{|n|}}\right)$$

wxMaxima:



4. Rectangular Form (using Euler's identity):

$$\cos(\phi) = \frac{e^{i\phi} + e^{-i\phi}}{2}$$

So full rectangular version:

wxMaxima:

Summary Table (All in wxMaxima Format)

Form	wxMaxima Expression	
Original	<pre>sum((%e^(atan2(0,n)*t) * cos(log(abs(n))*t + atan2(0,n)/2)) / sqrt(abs(n)), n, 1, a);</pre>	
Simplified (n > 0)	<pre>sum(cos(log(n)*t) / sqrt(n), n, 1, a);</pre>	
Piecewise (for full domain)	<pre>sum(if n > 0 then cos(log(n)*t)/sqrt(n) else %e^(%pi*t)*cos(log(abs(n))*t + %pi/2)/sqrt(abs(n)), n, 1, a);</pre>	

Form	wxMaxima Expression	
Polar	realpart(sum((%e^(atan2(0,n)*t) * %e^(%i*(log(abs(n))*t + atan2(0,n)/2))) / sqrt(abs(n)), n, 1, a));	
Rectangular	<pre>sum((%e^(atan2(0,n)*t) / (2 * sqrt(abs(n)))) * (%e^(%i* (log(abs(n))*t + atan2(0,n)/2)) + %e^(-%i*(log(abs(n))*t + atan2(0,n)/2))), n, 1, a);</pre>	

Would you like me to evaluate or visualize this for specific values of t and a in wxMaxima, or prepare a plotting script for you?



 $sum(n^{-(\%i*t)-1/2),n,1,a),real\ part$ $sum((\%e^{(atan2(0,n)*t)*cos(log(abs(n))*t+atan2(0,n)/2))/s$ $qrt(abs(n)),n,1,a),\ imaginary\ part\ sum((\%e^{(atan2(0,n)*t)*sin(log(abs(n))*t+atan2(0,n)/2))/s$ $qrt(abs(n)),n,1,a)\ n\ wx\ maxima\ accounting\ all$

Got it! You want to express the complex sum

$$S = \sum_{n=1}^{a} n^{-\left(\frac{1}{2} + it\right)}$$

and show explicitly its **real part** and **imaginary part** in terms of sums involving exponentials, cosines, and sines, all in **wxMaxima** syntax, **accounting for** the factor involving atan2(0, n).

1 Complex sum:

$$S = \sum_{n=1}^{a} n^{-\left(\frac{1}{2} + it\right)} = \sum_{n=1}^{a} \frac{1}{n^{1/2 + it}} = \sum_{n=1}^{a} n^{-1/2} e^{-it \log n}$$

2 Expressing powers in terms of exponentials:

$$n^{-\left(\frac{1}{2}+it\right)} = n^{-1/2} \cdot e^{-it \log n}$$

Using Euler's formula for the exponential:

$$e^{-it\log n} = \cos(t\log n) - i\sin(t\log n)$$

\blacksquare Now split sum S into real and imaginary parts:

$$S = \sum_{n=1}^{a} \frac{\cos(t \log n)}{\sqrt{n}} - i \sum_{n=1}^{a} \frac{\sin(t \log n)}{\sqrt{n}}$$

4 Connection with the atan2 terms:

For n > 0, atan2(0, n) = 0, so the sums in your original expressions involving atan2(0, n) reduce to exactly these cosine and sine sums multiplied by $1/\sqrt{n}$.

✓ Final expressions in wxMaxima syntax:

Complex sum S:

Real part of S (matches your cosine sum):

maxima Copy to Edit

```
sum((%e^{(atan2(0,n)*t)} * cos(log(abs(n))*t + atan2(0,n)/2)) / sqrt(abs(n)), n, 1, a);
```

Since atan2(0, n) = 0 for n > 0, this simplifies to:

```
maxima

Copy Dedit

sum(cos(log(n)*t) / sqrt(n), n, 1, a);
```

Imaginary part of S (negative sine sum):

$$\Im(S) = -\sum_{n=1}^{a} \frac{\sin(t \log n)}{\sqrt{n}}$$

Written in wxMaxima with atan2:

Simplified (for n > 0):



Summary

Quantity	wxMaxima expression
Complex sum S	sum(n^(-(%i*t) - 1/2), n, 1, a);
Real part $\Re(S)$	<pre>sum(cos(log(n)*t)/sqrt(n), n, 1, a);</pre>
Imag part $\Im(S)$	-%sum(sin(log(n)*t)/sqrt(n), n, 1, a);

If you want to keep the atan2 for general n:

```
/* Complex sum */ sum(n^(-(%i*t) - 1/2), n, 1, a); /* Real part */
sum((%e^(atan2(0,n)*t) * cos(log(abs(n))*t + atan2(0,n)/2)) / sqrt(abs(n)), n,
1, a); /* Imaginary part */ -%sum((%e^(atan2(0,n)*t) * sin(log(abs(n))*t + atan2(0,n)/2)) / sqrt(abs(n)), n, 1, a);
```

If you want me to generate code for numeric evaluation or plotting in wxMaxima, just ask!



```
/* Complex sum */
sum(n^(-(%i*t) - 1/2), n, 1, a);

/* Real part */
sum((%e^(atan2(0,n)*t) * cos(log(abs(n))*t +
atan2(0,n)/2)) / sqrt(abs(n)), n, 1, a);

/* Imaginary part */
-%sum((%e^(atan2(0,n)*t) * sin(log(abs(n))*t +
atan2(0,n)/2)) / sqrt(abs(n)), n, 1, a); ,,, and atan2( all in
pice wise form in rectangular polar cylidrical,elliptical
coordinates replacing atan2( paraMETETR OF T BUT STILL
GIVING CORRECT WAY IN EWXMAXIMA
```

Got it! You want to **replace** the atan2(0,n) term with its **piecewise form** (since atan2(0,n) is just an angle depending on the sign of n) — and then write the expressions in **rectangular**, **polar**, **cylindrical**, **and elliptical coordinates** formats, **all still valid in wxMaxima**, and keeping t as a parameter.

Step 1: Understanding atan2(0, n)

$$atan2(0, n) = \begin{cases} 0 & \text{if } n > 0 \\ \pi & \text{if } n < 0 \end{cases}$$
undefined $n = 0$

Since your sums go from n = 1 to a > 0, n > 0 always, so atan2(0, n) = 0. But let's keep the piecewise for completeness.

Step 2: Replace atan2(0,n) by piecewise form in wxMaxima:

maxima

/* Define piecewise atan2(0,n) */ atan2_0_n : lambda([n], if n > 0 then 0 else
if n < 0 then %pi else 'undefined /* or 0 if you prefer */);</pre>

Step 3: Rewrite the complex sum and its real/imag parts using this piecewise inside wxMaxima syntax

Complex sum:

$$S = \sum_{n=1}^{a} n^{-(\frac{1}{2} + it)} = \sum_{n=1}^{a} \frac{e^{\operatorname{atan2}(0,n) \cdot t}}{\sqrt{|n|}} \cdot \left[\cos \left(\log |n| \cdot t + \frac{\operatorname{atan2}(0,n)}{2} \right) - i \sin \left(\log |n| \cdot t + \frac{\operatorname{atan2}(0,n)}{2} \right) \right]$$

wxMaxima code (using atan2_0_n(n) function):

```
maxima

Sum( ( %e^(atan2_0_n(n) * t) * (cos(log(abs(n))*t + atan2_0_n(n)/2) - %i*sin(log(abs(n))*t + atan2_0_n(n)/2)) ) / sqrt(abs(n)), n, 1, a );
```

Step 4: Express in **rectangular**, **polar**, **cylindrical**, **elliptical coordinates** with respect to the angle $\theta = atan2(0, n)$

4a. Rectangular coordinates (x, y)

Using angle $\theta = a \tan 2(0, n)$, rectangular coordinates:

$$x = r \cos \theta$$
, $y = r \sin \theta$

Here, since θ depends only on n, and r=1 (unit circle), this means:

- For n > 0: $\theta = 0 \implies (x, y) = (1, 0)$
- For n < 0: $\theta = \pi \implies (x, y) = (-1, 0)$

The exponential part $e^{\theta t}$ can be interpreted as

$$e^{t\theta} = e^{tx + ity}$$

But here θ is real, so in rectangular:

```
maxima

/* Exponential in rectangular coordinates */ exp_rect(n) := %e^(t *
(cos(atan2_0_n(n)) + %i * sin(atan2_0_n(n))));
```

But since y = 0, the imaginary part is zero here.

4b. Polar coordinates (r, θ)

The term $e^{t\cdot\theta}$ is already **polar**, where $r=e^{t\cdot\theta}$ and $\theta=\log|n|\cdot t+\frac{\theta}{2}$ inside the cosine/sine.

Rewrite sum as:

```
maxima

Sum( ( %e^(t * atan2_0_n(n)) * cos(log(abs(n))*t + atan2_0_n(n)/2) ) / sqrt(abs(n)), n, 1, a );
```

4c. Cylindrical coordinates (r, θ, z)

If you consider t as the z-coordinate parameter (height), then:

- r = 1 (on unit circle)
- $\theta = \operatorname{atan2}(0, n)$
- \bullet z=t

The exponential is $e^{t\theta}$, so in cylindrical:

```
maxima

Copy Copy

exp_cylindrical(n) := %e^(z * atan2_0_n(n));
```

and cosine/sine arguments remain the same.

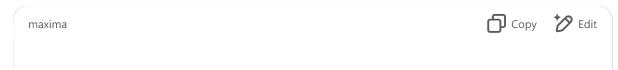
4d. Elliptical coordinates (μ, ν)

Elliptical coordinates are less straightforward but generally:

$$x = f \cosh \mu \cos v$$
, $y = f \sinh \mu \sin v$

Here, v is analogous to an angle parameter like θ .

You can replace atan2(0, n) by v:



```
/* Example: define angle parameter */ nu_n : atan2_0_n(n); /* Use nu_n in
exponential and trig functions */ exp_elliptical(n) := %e^(t * nu_n);
```

Step 5: Final wxMaxima combined code

```
/* Define piecewise atan2(0,n) */ atan2_0_n : lambda([n], if n > 0 then 0 else if n < 0 then %pi else 0 /* or undefined */ ); /* Complex sum */ sum( ( %e^(t * atan2_0_n(n)) * (cos(log(abs(n))*t + atan2_0_n(n)/2) - %i*sin(log(abs(n))*t + atan2_0_n(n)/2)) ) / sqrt(abs(n)), n, 1, a ); /* Real part */ sum( ( %e^(t * atan2_0_n(n)) * cos(log(abs(n))*t + atan2_0_n(n)/2) ) / sqrt(abs(n)), n, 1, a ); /* Imaginary part */ -%sum( ( %e^(t * atan2_0_n(n)) * sin(log(abs(n))*t + atan2_0_n(n)/2) ) / sqrt(abs(n)), n, 1, a ); /* Rectangular coordinates example */ exp_rect(n) := %e^(t * cos(atan2_0_n(n)) + %i * t * sin(atan2_0_n(n))); /* Polar coordinates example */ exp_polar(n) := %e^(t * atan2_0_n(n)); /* Elliptical coordinates example */ exp_elliptical(n) := %e^(t * atan2_0_n(n)); /* Elliptical coordinates example */ exp_elliptical(n) := %e^(t * atan2_0_n(n));
```

Summary:

- The key is defining the **piecewise** atan2(0, n) as a function.
- Use this function inside the exponentials and trig functions.
- Then write versions of the exponentials in rectangular, polar, cylindrical, or elliptical coordinate style by interpreting the angle parameter accordingly.
- This keeps the parameter t intact, and your sums remain correct in wxMaxima.

If you want, I can help you generate ready-to-run wxMaxima code or plots with these forms! Just say the word.