The role of arc length in defining the position of a prime number...

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If the integral arc length calculation is made for the number below, which was deduced from Riemann's fundamental trigonometric relations, then the number "c" 6.797032310 can be obtained, which has magical properties in relation to prime numbers and their positions, as can be observed by the results obtained in the study program of position relations, arc length and correlated prime numbers. In reality the magical properties do not exist as can be any number in the arc length integral that the relations are still maintained.

n×0.98844448495/0.15158331094 | n = -37607875619 to 37607875619

```
c = 6.597032310; (* List of prime numbers in desired positions *)

primes = {104729, 163841, 224737, 287117, 999999000001};

(* Function to calculate the definite integral from -n to n *)

CalculateIntegral[n_] := c * 2 * n

(* Calculate and print the integrals for each prime number *)

results = Table[

n = prime;

integral = CalculateIntegral[n];

Print["The definite integral from -", n, " to ", n, " is ", integral]; integral,

{prime, primes}

]

(* Adjust to calculate integral1 *)

primes = {104729, 163841, 224737, 287117, 999999000001};

primes = PrimePi[primes];

results1 = Table[

n = prime;
```

```
integral1 = CalculateIntegral[n];

Print["The definite integral from -", n, " to ", n, " is ", integral1];

integral1,

{prime, primes}

]


(* Calculate and print the divisions *)

divisions = results / results1;

Print["The values of the divisions are: ", divisions]; a=divisions

results1/(2*c)
```

(Debug) During evaluation of In[1]:= The definite integral from -104729 to 104729 is 1.3818*10^6

(Debug) During evaluation of In[1]:= The definite integral from -163841 to 163841 is 2.16173*10^6

(Debug) During evaluation of In[1]:= The definite integral from -224737 to 224737 is 2.96519*10^6

(Debug) During evaluation of In[1]:= The definite integral from -287117 to 287117 is 3.78824*10^6

(Debug) During evaluation of In[1]:= The definite integral from -999999000001 to 999999000001 is 1.31941*10^13

(Debug) Out[4]= {1.3818*10^6,2.16173*10^6,2.96519*10^6,3.78824*10^6,1.31941*10^13}

(Debug) During evaluation of In[1]:= The definite integral from -10000 to 10000 is 131941.

(Debug) During evaluation of In[1]:= The definite integral from -15000 to 15000 is 197911.

(Debug) During evaluation of In[1]:= The definite integral from -20000 to 20000 is 263881.

(Debug) During evaluation of In[1]:= The definite integral from -25000 to 25000 is 329852.

(Debug) During evaluation of In[1]:= The definite integral from -37607875619 to 37607875619 is 4.96201*10^11

(Debug) Out[7]= {131941.,197911.,263881.,329852.,4.96201*10^11}

(Debug) During evaluation of In[1]:= The division values are: {10.4729,10.9227,11.2368,11.4847,26.5901}

(Debug) Out[10]= {10.4729,10.9227,11.2368,11.4847,26.5901} (Debug) Out[11]= {10000.,15000.,20000.,25000.,3.76079*10^10}

Input interpretation

Plot

- Enlarge
- Data
- Customize

Arc length of curve

- Step-by-step solution

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STEP 1

Calculate the arc length of the following curve from $n = -37\,607\,875\,619$ to $n =$ $37\,607\,875\,619$:

$$y(n) = 6.520800204\, n$$

STEP 2

Hint: The definition of arc length in Cartesian coordinates is $s = \int_{n_0}^{n_1} \sqrt{1 + y'(n)^2}\, dn$.

Apply the definition of arc length to $y(n) = 6.520800204\, n$ for $-37\,607\,875\,619 < n < 37\,607\,875\,619$:

$$s = \int_{-37\,607\,875\,619}^{37\,607\,875\,619} \sqrt{1 + \left(\frac{d}{dn}(6.520800204\, n)\right)^2}\, dn$$

STEP 3

- Show intermediate steps

Hint: What is $\frac{d}{dn}(6.520800204\, n)$?

Compute the derivative $\frac{d}{dn}(6.520800204\, n)$:

$$= \int_{-37\,607\,875\,619}^{37\,607\,875\,619} \sqrt{1 + 6.520800204^2}\, dn$$

STEP 4

Hint: Can the integrand be simplified?

Simplify $\sqrt{1 + 6.520800204^2}$:

$$= \int_{-37\,607\,875\,619}^{37\,607\,875\,619} 6.597032310\, dn$$

STEP 5

- Show intermediate steps

Hint: Can this integral be computed?

Compute the definite integral:

Answer:

$$= 4.9620074117 \times 10^{11} \approx 4.9620 \times 10^{11}$$

Input interpretation

Plot

- Enlarge
- Data

- Customize

Arc length of curve

- Step-by-step solution

Arc length of curve:

- Arc length formula
- Hide hints

STEP 1

Calculate the arc length of the following curve from $n = -999\,999\,000\,001$ to n
$999\,999\,000\,001$:

$$y(n) = 6.520800204\,n$$

STEP 2

> **Hint:** The definition of arc length in Cartesian coordinates is $s = \int_{n_0}^{n_1} \sqrt{1 + y'(n)^2}\, dn$.

Apply the definition of arc length to $y(n) = 6.520800204\,n$ for $-999\,999\,000\,001 < n < 999\,999\,000\,001$:

$$s = \int_{-999\,999\,000\,001}^{999\,999\,000\,001} \sqrt{1 + \left(\frac{d}{dn}(6.520800204\,n)\right)^2}\, dn$$

STEP 3

- Show intermediate steps

> **Hint:** What is $\frac{d}{dn}(6.520800204\,n)$?

Compute the derivative $\frac{d}{dn}(6.520800204\,n)$:

$$= \int_{-999\,999\,000\,001}^{999\,999\,000\,001} \sqrt{1 + 6.520800204^{2}}\, dn$$

STEP 4

Hint: Can the integrand be simplified?

Simplify $\sqrt{1 + 6.520800204^2}$:

$$= \int_{-999999\,000\,001}^{999999\,000\,001} 6.597032310\, dn$$

STEP 5

- Show intermediate steps

Hint: Can this integral be computed?

Compute the definite integral:

Answer:

$$= 1.3194051427 \times 10^{13} \approx 1.3194 \times 10^{13}$$