

# ArithmeticException: "Non-terminating decimal expansion; no exact representable decimal result"

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Asked 8 years, 8 months ago Active 1 month ago Viewed 276k times

Why does the following code raise the exception shown below?

472

```
BigDecimal a = new BigDecimal("1.6");
BigDecimal b = new BigDecimal("9.2");
a.divide(b) // results in the following exception.
```

73

```
java.lang.ArithmeticException: Non-terminating decimal expansion; no exact representable decir
```

java bigdecimal arithmeticexception

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edited Mar 9 '13 at 12:19

adelarsq 2,423 ● 3 ● 30 ● 43

asked Jan 4 '11 at 6:34

Jason 4,744 ● 16 ● 41 ● 63

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9 Answers

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From the [Java 8 docs](#):

789



When a MathContext object is supplied with a precision setting of 0 (for example, MathContext.UNLIMITED), arithmetic operations are exact, as are the arithmetic methods which take no MathContext object. (This is the only behavior that was supported in releases prior to 5.)

As a corollary of computing the exact result, the rounding mode setting of a MathContext object with a precision setting of 0 is not used and thus irrelevant. In the case of divide, the exact quotient could have an infinitely long decimal expansion; for example, 1 divided by 3.

If the quotient has a nonterminating decimal expansion and the operation is specified to return an exact result, an ArithmeticException is thrown. Otherwise, the exact result of the division is returned, as done for other operations.

To fix, you need to do something like this:

```
a.divide(b, 2, RoundingMode.HALF_UP)
```

where 2 is scale and RoundingMode.HALF\_UP is rounding mode

More details: <http://jaydeepm.wordpress.com/2009/06/04/bigdecimal-and-non-terminating-decimal-expansion-error/>

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edited Jul 24 at 16:33

vVicente 8 ● 5

answered Jan 4 '11 at 6:37

DVK 101k ● 28 ● 184 ● 292

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- 2 I don't think he needs the `toString` . – Matthew Flaschen Jan 4 '11 at 6:50
- 2 this works for jasper error too thanks [community.jaspersoft.com/questions/528968/](https://community.jaspersoft.com/questions/528968/) ... – shareef Jun 28 '14 at 10:00 
- 26 2 is NOT `precision` ; it's `scale` . Please see [docs.oracle.com/javase/7/docs/api/java/math/](https://docs.oracle.com/javase/7/docs/api/java/math/) ... – John Manko Sep 23 '15 at 16:20
- Thanks @behrang! You will hit the record of approvals :- ) – Pereira Aug 27 '18 at 16:33
- (`new BigDecimal(100)).divide(new BigDecimal(0.90), 2, RoundingMode.HALF_UP)` – egemen Nov 14 '18 at 6:34

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Because you're not specifying a precision and a rounding-mode. `BigDecimal` is complaining that it could use 10, 20, 5000, or infinity decimal places, and it still wouldn't be able to give you an exact representation of the number. So instead of giving you an incorrect `BigDecimal`, it just whinges at you.

However, if you supply a `RoundingMode` and a precision, then it will be able to convert (eg. 1.333333333-to-infinity to something like 1.3333 ... but you as the programmer need to tell it what precision you're 'happy with'.

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answered Jan 4 '11 at 6:39



David Bullock

4,083 ● 2 ● 27 ● 39

add a comment

You can do

51

```
a.divide(b, MathContext.DECIMAL128)
```

▼

You can choose the number of bits you want either 32,64,128.

Check out this link :

<http://edelstein.pebbles.cs.cmu.edu/jadeite/main.php?api=java6&state=class&package=java.math&class=MathContext>

share improve this answer

edited Apr 26 '13 at 13:47



DVK

101k ● 28 ● 184 ● 292

answered Mar 6 '13 at 2:49



MindBrain

2,945 ● 7 ● 38 ● 61

add a comment

For fixing such an issue I have used below code

13

```
a.divide(b, 2, RoundingMode.HALF_EVEN)
```

▼

2 is precision. Now problem was resolved.

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edited Mar 26 '15 at 19:03



Martin Serrano

3,137 ● 1 ● 26 ● 42

answered Mar 26 '15 at 18:23



Prahlad

131 ● 1 ● 2

3 in addition to the code, some explanation should be provided. – Martin Serrano Mar 26 '15 at 18:29

8 2 is NOT `precision` ; it's `scale` . Please see [docs.oracle.com/javase/7/docs/api/java/math/](https://docs.oracle.com/javase/7/docs/api/java/math/) ... – John Manko Sep 23 '15 at 16:20

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4 Big Decimal periodic number

0 Error while dividing `BigDecimal` value : `java.lang.ArithmeticException: Non-terminating decimal expansion; no exact representable decimal result`

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0 Rounding with `BigDecimal`?

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Sep 23 '15 at 16:21

3 RoundingMode.HALF\_EVEN is recommended for financial applications. This is what's used in banking – ACV Sep 19 '16 at 19:01

For those, who are confused by John Mankos's comment on precision, please see this answer [stackoverflow.com/questions/4591206/...](https://stackoverflow.com/questions/4591206/...) – Stimpson Cat Jun 22 '18 at 12:50

add a comment

▲ I had this same problem, because my line of code was:

6 

```
txtTotalInvoice.setText(var1.divide(var2).doubleValue() + "");
```

▼ I change to this, reading previous Answer, because I was not writing decimal precision:

```
txtTotalInvoice.setText(var1.divide(var2,4, RoundingMode.HALF_UP).doubleValue() + "");
```

4 is Decimal Precision

AND RoundingMode are Enum constants, you could choose any of this UP, DOWN, CEILING, FLOOR, HALF\_DOWN, HALF\_EVEN, HALF\_UP

In this Case HALF\_UP, will have this result:

```
2.4 = 2
2.5 = 3
2.7 = 3
```

You can check the RoundingMode information here: <http://www.javabeat.net/precise-rounding-of-decimals-using-rounding-mode-enumeration/>

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edited Jun 2 at 14:09

heav1  
6,287 ● 3 ● 7 ● 30

answered Nov 15 '14 at 20:38

Alex Montenegro1987  
61 ● 1 ● 1

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▲ It's a issue of rounding the result, the solution for me is the following.

3 

```
divider.divide(dividend,RoundingMode.HALF_UP);
```

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answered Aug 7 '18 at 13:32

Jorge Santos Neill  
366 ● 1 ● 5

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▲ Answer for [BigDecimal throws ArithmeticException](#)

1 

```
public static void main(String[] args) {
    int age = 30;
    BigDecimal retireMentFund = new BigDecimal("10000.00");
    retireMentFund.setScale(2,BigDecimal.ROUND_HALF_UP);
    BigDecimal yearsInRetirement = new BigDecimal("20.00");
    String name = " Dennis";
    for ( int i = age; i <=65; i++){
        recalculate(retireMentFund,new BigDecimal("0.10"));
    }
    BigDecimal monthlyPension = retireMentFund.divide(
```

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```
BigDecimal monthlyPension = retirementFund.divide(  
    yearsInRetirement.divide(new BigDecimal("12"), new MathContext(2, RoundingMode.  
        System.out.println(name+ " will have £" + monthlyPension +" per month for retirement");  
    }  
    public static void recalculate (BigDecimal fundAmount, BigDecimal rate){  
        fundAmount.multiply(rate.add(new BigDecimal("1.00")));  
    }  
}
```

Add MathContext object in your divide method call and adjust precision and rounding mode. This should fix your problem

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edited May 23 '17 at 11:55

answered Jun 20 '16 at 16:53



Community ♦  
1 • 1



Poorna Chander  
45 • 5

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1

It is because the BigDecimal has no lost, and if you divide 1/3 for example, it will result in a repeating decimal to infinity. 0.33333333... theoretically if you multiply back, you receive the exact result. But, an infinity number will generate stack over flow and in this case the exception is launched.



a solution:

```
try {  
    result = n1.divide(n2);  
} catch (ArithmeticException e){  
    Log.d("Error bigdecimal", e.toString());  
    result = (n1.doubleValue() / n2.doubleValue());  
};
```

or

```
n1.divide(n2,RoundingMode.HALF_UP);
```

in this case your result will not be cut by Rounding

share improve this answer

edited Mar 21 at 4:18

answered Oct 27 '16 at 1:00



Leo Lima  
56 • 5

3 This is a 'gambiarra'. Please use the solution with RoundingMode. – William Crozeta Jun 6 '17 at 14:29

add a comment



Your program does not know what precision for decimal numbers to use so it throws:

0

```
java.lang.ArithmeticException: Non-terminating decimal expansion
```



**Solution to bypass exception:**

```
MathContext precision = new MathContext(int setPrecisionYouWant); // example 2  
BigDecimal a = new BigDecimal("1.6",precision);  
BigDecimal b = new BigDecimal("9.2",precision);  
a.divide(b) // result = 0.17
```

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answered Jun 29 '18 at 9:48



Miloš Ojđanić  
1

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
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
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
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