From: Phillip Weiss
Sent: Monday, December 06, 2010 9:53 PM
To: Laurence Kirby
Subject: Math 2160 - Apportionment problem

Dear Prof. Kirby,

I was reviewing the Hamilton, Jefferson and Adams Apportionment methods for this problem:

There are 3 states, A, B and C, with a total population of 90. Total number of representaives is 11. How are the 11 reps to be apportioned amongst A, B, and C?

A = 40
B = 30
C = 20

<u>Hamilton</u> <u>method</u>:

The Standard Divisor = 90/11 = 8.18

Q (A) = 40/8.18 = 4.89
Q (B) = 30/8.18 = 3.67
Q (C) = 20/8.18 = 2.44

Total = 9 plus 2 left over. A and B are assigned 1 each yielding a total of 11. (A:5, B:4, C:2)

<u>Jefferson</u> <u>method</u>:

Modified Divisor = 7.5

Q (A) = 40/7.5 = 5.33
Q (B) = 30/7.5 = 4
Q (C) = 20/7.5 = 2.66

Rounding off to the lowest complete number yields a total of 11. (A:5, B:4, C:2)

<u>Adams</u> <u>method</u>:

I could not find a modified divisor > 8.18, that yielded a total of 11. The closest I could get was 12.

e.g.:

Modified Divisor = 10

Q (A) = 40/10 = 4.00
Q (B) = 30/10 = 3.00
Q (C) = 20/10 = 2.00

Total = 9

Modifed Divisor = 9.5

Q (A) = 40/9.5 = 4.21
Q (B) = 30/9.5 = 3.16
Q (C) = 20/9.5 = 2.11

Rounding off to the next highest complete number yields a total of 5 + 4 + 3 = 12.

Modified Divisor = 9

Q (A) = 40/9 = 4.44
Q (B) = 30/9 = 3.33
Q (C) = 20/9 = 2.22

Applying the same rule noted above, the total again is 5 + 4 + 3 = 12.

Modified Divsor = 8.5

Q (A) = 40/8.5 = 4.71
Q (B) = 30/8.5 = 3.53
Q (C) = 20/8.5 = 2.35

Applying the same rule noted above, the total again is 5 + 4 + 3 = 12.

Could you please verify these figures for me.

Thank you.

Phillip Weiss

From: phillip.weiss@baruchmail.cuny.edu
To: laurence.kirby@baruch.cuny.edu
Subject: FW: Math 2160 - Mandelbrot
Date: Wed, 24 Nov 2010 10:27:20 -0500

Dear Prof Kirby,

Benoit Mandelbrot, who introduced the term "fractal, "died on October 14, 2010. He was born in Warsaw, Poland, grew up in Paris, worked in Europe and the United States, and observed patterns in objects that others dismissed as unmeasurable. Mandelbrot was brilliant.
http://www.nytimes.com/2010/10/17/us/17mandelbrot.html

Phillip Weiss

From: phillip.weiss@baruchmail.cuny.edu
To: laurence.kirby@baruch.cuny.edu
Subject: FW: Math 2160 - Mandelbrot Processes
Date: Tue, 23 Nov 2010 21:04:47 -0500

Proof that that the Golden Ratio is valid:

The Golden Ratio formula is x/1 = 1/x-1   x = to the length of a certain rectangle of a certain area.

If the width of a rectangle is 5, then x will equal approximately 8.

(5 x 1.61 = 8.05; 8/5 = 1.6)

x/5 = 5/x-5 = x^2 - 5x -25

x = - (-5) +/- sq. rt. [(-5)^2 - 4(1)(-25)]/2(1)

= 5 +/- sq. rt. [125]/2

= 5 + 5(sq. rt. 5)/2

= 5/2 + 5(sq. rt. 5)/2

= 2.5 + 11.1803/2

x = 8.090

8.090/5 = 1.618

5/8.090 - 5 = 5/3.09 = 1.618

The Golden Ratio checks.

Phillip Weiss

From: phillip.weiss@baruchmail.cuny.edu
To: laurence.kirby@baruch.cuny.edu
Subject: FW: Math 2160 - Mandelbrot Processes
Date: Tue, 23 Nov 2010 20:13:09 -0500

S = (3 - 2i)

S(3) = (-129 - 226i)^2 + (3 - 2i)

= 16,641 + 29,154i + 29,154i + 51,076i^2 + (3 - 2i)

= -34,432 + 29,152i

Phillip Weiss

From: phillip.weiss@baruchmail.cuny.edu
To: laurence.kirby@baruch.cuny.edu
Subject: RE: Math 2160 - Mandelbrot Processes
Date: Tue, 23 Nov 2010 16:56:36 -0500

Dear Prof. Kirby,

Thank you for your comments.

S(n+1) = (S(n))^2 + S

e.g.

Seed = 10

S(0) = 10

S(1) = 10^2 + 10 = 110

S(2) = 110^2 + 10 = 12,110

S(3) = 12,110^2 + 10 = 146,652,110

S(4) = 2.150684137 x 10 (16)

S(5) = 4.625442256 x 10 (56)

This process is escaping.

<u>Seed</u> = .1

S(0) = .1

S(1) = .1^2 + .1 = .11

S(2) = .11^2 + .1 = .1121

S(3) = .1121^3 + .1 = .11256641

S(4) = .11256641^2 + .1 = .112671196

S(5) = .112671196^2 + .1 = .112694798

This process is attracting.

<u>Seed</u> = -.1

S(0) = -.1

S(1) = -.1^2 + (-.1) = -.09

S(2) = .-.09^2 + (-.1) = -.0919

S(3) = -.0919^2 + (-.1) = -.09155439

S(4) = -.09155439^2 +(-.1) = -.091617793

This process is alternating.

<u>Seed</u> = -10

S(0) = -10

S(1) = -10^2 + (-10) = 90

S(2) = 90^2 +(-10) = 8090

S(3) = 8090^2 + (-10) = 65,448,090

This process is escaping.

Seed = (3 - 2i)

S(0) = 3 - 2i

S(1) = (3 - 2i)^2 + (3 - 2i) = 9 - 6i - 6i + 4i^2 + (3 - 2i) = 8 - 14i

S(2) = (8 - 14i)^2 + (3 - 2i) = 64 - 112i - 112i + 196i^2 + (3 - 2i) = -129 - 226i

This process is escaping.

Phillip Weiss

From: Phillip Weiss
Sent: Monday, November 22, 2010 9:26 PM
To: Laurence Kirby
Subject: Math 2160 - Another Fractal and a question

Dear Prof. Kirby,

Attached are the graphics for a fractal. The seed is a square.

The interesting features about this fractal are that the perimeter increases both outwardly and inwardly and that the perimeter doubles with each step.

Here are the computations:

M = 4(4)^n L = 5/2^n P = M x L

Step 0: M = 4 L=5 P=20

Step 1: M = 16 L = 2.5 P = 40

Step 2: M = 64 L = 1.25 P = 80

Step 3: M = 256 L = .625 P = 160

Step 4: M = 1024 L = .3125 P = 320

Step 5: M = 4096 L = .15625 P = 640

Step 10: M = 4,194,304 L = .004883 P = 20,480

Step 20: M = 4.398046511 x 10 (12) L = .000004768 P = 20,971,520

Question: In this class we have been introduced to pi, phi and i. The first two are irrational numbers, the third, an imaginary number. Now I know that these numbers have been computed to the nth decimal point, yet they are still irrational. Does this mean that computations involving these particular numbers, and irrational numbers in general, can never be 100 percent precise?

Thank you.

Phillip Weiss