ADD A RESUME SKILL ITEM

Want to impress potential schools or employers?

Include '**Mastery of CertainError Uncertainty Calculator**' on your Resume skill list

To achieve mastery, use the CertainError Calculator to complete the 8 exercises on the PROBLEMS document to earn points.

Need clues? Follow the detailed steps on each worksheet of the STEPS spreadsheet.

Save the completed spreadsheet and check your answers with the ANSWERS spreadsheet.

Your completed and saved spreadsheet documents and verifies this to any school or employer.

OVERVIEW OF PROBLEMS

#	Activity	Problem Type	Operations	Maximum Points	Assessment Questions
1	Inverse Hyperbolic Sine	Mathematics	Unary	6	3
2	Multiply	Geometry	Binary	7	2
3	Square root and Square	Mathematics	Unary	8	3
4	Monte-Carlo Multiply	Finance	Binary	11	2
5	Divide and Compare	Finance	Binary and Method Comparison	12	3
6	Subtract and Divide	Engineering	Binary	12	3
7	Mean value	Statistics	Binary	18	2
8	Sine and Divide	Mathematics	Unary and Binary	26	2
			TOTALS	100	20

CertainError

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Problem type   Mathematics

Difficulty Points (out of 100)   6

Resume skill list   Unary operation

Problem description   Calculate the inverse hyperbolic sine of Zero with error

Source data given   Zero with error   Z

	center	error	
Z	0	± 0.5	[-]

Record Answer

Duals

	center	error	
		±	[-]

reporting 3 sigfigs

Assessment

1 Examine a graph of asinh near 0 and predict output error

2 Does the error grow?

3 Is the given data legal for calculating *acosh* using the duals method?

Press the ? button on the calculator to access the online calculator
help menu and find out more about methods and operations
or use the link:
http://certainerror.com/calculator-help-menu/
The help menu section 4.3.2. is relevant to this question.

Use the CertainError app for Apple or Android devices

Complete this and earn level of Difficulty points

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Problem type

Geometry

Difficulty Points (out of 100)

7

Resume skill list

Binary operation

Problem description

Calculate the area of floor of dimension 7.52 [m] by 3.21 [m]

Source data given

		center	*error is ± half the smallest increment*	
Length of a room (to nearest cm)	L	7.52	± 0.005	[m]
Width of a room (to nearest cm)	W	3.21	± 0.005	[m]

Record Answer

	center	error	
Duals		±	[inches]

Assessment

1 Estimate the relative error in percent

2 Is the error acceptable?

Problem type

Mathematics

Difficulty Points (out of 100)

8

Resume skill list

Unary operations

Problem description

It is claimed that the duals method is robust and can calculate

square root of negative with error.

To test this, perform a square root of negative with error.

This is followed by a squaring to see if the original number is recovered.

Source data given

Starting number   X

error is ± half the

	center	*smallest increment*
	-63 ±	16

Record Answer

		center	error	
Duals	Starting	-63	± 16	[inches]
	Ending		±	[inches]

Assessment

1 How do the Starting and Ending numbers compare?

2 Can another method do this?

3 Should the 'square root of negative with error' be used?

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Problem type

Finance

Difficulty Points (out of 100)

11

Resume skill list

Binary operation

Problem description

What is the annual gain of a $200,000 invested in a security that has an annual mean rate of 4.2% with 8.1% uncertainty.

Source data given

		center	error	
Principle	P	200000 ±	0.000	[m]
Rate	r	0.042 ±	8.1	[m,%]

use the Monte-Carlo method
see section 3.3. of the CertainError app Help menu
http://certainerror.com/calculator-help-menu/

Record Answers

	Trial	center	error	
Monte-Carlo	1		±	[$]
Press = for each new trial	2		±	[$]
	3		±	[$]
	4		±	[$]

Assessment

1 What is the worst case gain?

2 Which trial has the highest uncertainty?

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Problem type

Finance

Difficulty Points (out of 100)

12

Resume skill list

Binary operation

Method comparison

Problem description

A stockbroker claims an investment has grown 5% in one year.

For each method, calculate the actual growth and compare results to 5%

Source data given

			center is P		error is eP	
Final Price	P_1		106.75	±	0.125	[dollars]
Initial Price	P_0		101.50	±	0.125	[dollars]

Record Answers

record answers for each method

Arithmetic	UE	centers	errors
Traditional	Td		±
Interval	Iv		±
Monte-Carlo	Mc		±
Differential	Df		±
Chordal	Ch		±
Duals	Du		±

Assessment

By visual comparison of results

1 Which method gives the least error?

2 Which method gives the highest error?

3 Is the 5% claim valid?

![CertainError logo]

Use the CertainError app for Apple or Android devices

Complete this and earn level of Difficulty points

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CertainError app for Android devices https://play.google.com/store/apps/details?id=com.certainerror.certainerrorcalculator

CertainError app for Apple devices https://itunes.apple.com/us/app/certainerror-calculator/id1156917475?mt=8

Problem type

Engineering

Difficulty Points (out of 100)

12

Resume skill list

Binary operations

Problem description

A pipe has an outer diameter and inner diameter.

Calculate wall thickness using Duals.

Source data given

		center is D	error is eD	
Outer Diameter	D_2	4.00	± 0.03125	[inches]
Inner Diameter	D_1	3.75	± 0.03125	[inches]

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Record Answers

center   error

Duals   WT   ± [inches]

Assessment

1 Estimate the relative error in percent

2 Is the error acceptable?

3 What can be done to lower the error of the thickness?

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CertainError app for Apple devices   https://itunes.apple.com/us/app/certainerror-calculator/id1156917475?mt=8

Problem type   Statistics

Difficulty Points (out of 100)   18

Resume skill list   Binary operations

Problem description   A set of four temperatures were measured independently over a day's time on a thermometer with 2 [deg C] increments.

Calculate the average temperature.

Source data given

		center is T	error is ± half the smallest increment	
Temperature at 6 am	T_1	-4	± 1	[deg C]
Temperature at 12 pm	T_2	2	± 1	[deg C]
Temperature at 6 pm	T_3	0	± 1	[deg C]
Temperature at 12 am	T_4	-2	± 1	[deg C]

Record Answers

Record answers   center   error

Duals   ± [inches]

Assessment

1 How does the error evolve as the total is tallied?

2 How could error of the mean temperature be reduced?

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CertainError app for Apple devices   https://itunes.apple.com/us/app/certainerror-calculator/id1156917475?mt=8

Problem type   Mathematics

Difficulty Points (out of 100)   26

Resume skill list   Unary operations

Problem description

An important term in the 'Gibbs Phenomenon' is the sine function of t

divided by t , f = sin(t)/t   or what is referred as the 'sinc' function.

In the theory, this is integrated over t from 0 to +pi.

Calculate f at the limit points. First for t = +pi(2 digits) or +3.15

and then repeat the calculation for t = +0(2 digits) or +0.00

Source data given

			center	*error is ± half the smallest increment*	
Upper angle limit	t		3.14	± 0.005	[radians]
Lower angle limit	t		0.00	± 0.005	[radians]

Record Answers

		center	error	
Duals	Upper		±	[inches]
	Lower		±	[inches]

Assessment

1 How do the answers compare to exact theoretical answers?

	center	error
Upper	0	± 0
Lower	1	± 0

2 Is there a dependency problem?

see section 7.6. of the CertainError app Help menu

http://certainerror.com/calculator-help-menu/