

Course

<u>Progress</u>

<u>Dates</u>

Discussion

<u>Wiki</u>

☆ Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Exercises

✓ Previous				Next >
		_		

Problem 2.1

□ Bookmark this page

Problem 2.1

1 point possible (ungraded)

Find the principal part of the Laurent series of

$$\frac{1+2z^2}{z^3+z^5}$$

at point z=0.

$$\frac{1}{z^3} + \frac{1}{z^2} + \frac{1}{z}$$

	-2	-1	0	1	2		
--	----	----	---	---	---	--	--

Submit

You have used 0 of 6 attempts

< Previous

Next >

© All Rights Reserved



edX

About

Affiliates

edX for Business

Open edX

<u>Careers</u>

<u>News</u>



Course <u>Progress</u>

<u>Dates</u> **Discussion** <u>Wiki</u>

Problem 2.2 Problem 2.2 2 points possible (ungraded) Find the order of the pole and coefficient in front of $\frac{1}{z}$ of Laurent series at point $z=0$ for the function $f(z)=\frac{1}{z\left(e^z-1\right)}.$ Order of the pole Coefficient in front of $\frac{1}{z}$ Submit You have used 0 of 6 attempts	Next								Previous
Problem 2.2 2 points possible (ungraded) Find the order of the pole and coefficient in front of $\frac{1}{z}$ of Laurent series at point $z=0$ for the function $f(z)=\frac{1}{z\left(e^z-1\right)}.$ Order of the pole									
2 points possible (ungraded) Find the order of the pole and coefficient in front of $\frac{1}{z}$ of Laurent series at point $z=0$ for the function $f(z)=\frac{1}{z\left(e^z-1\right)}.$ Order of the pole								oage	Bookmark this p
Find the order of the pole and coefficient in front of $\frac{1}{z}$ of Laurent series at point $z=0$ for the function $f(z)=\frac{1}{z\left(e^z-1\right)}.$ Order of the pole								2.2	Problem
Order of the pole Coefficient in front of $\frac{1}{z}$		unction	=0 for the fu	ries at point z	of Laurent se	nt in front of $\frac{1}{z}$	and coefficie	ible (ungraded) ler of the pole	2 points possi Find the ord
Coefficient in front of $\frac{1}{z}$				- .	$=rac{1}{z\left(e^{z}-1 ight) }$	$f\left(z ight)$			
								e pole	Order of the
Submit You have used 0 of 6 attempts								n front of $\frac{1}{z}$	Coefficient i
Submit You have used 0 of 6 attempts									
Submit You have used 0 of 6 attempts									
						ots	ed 0 of 6 attemp	You have use	Submit

© All Rights Reserved



edX

About

Affiliates

edX for Business

Open edX

Careers

News



Course

Progress

ss Dates

Discussion

Wiki

* Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Dedicated problems

< Previous

Next >

Problem 2.3

☐ Bookmark this page

Homework due Oct 31, 2020 20:00 EDT Completed

Problem 2.3

1/2 points (graded)

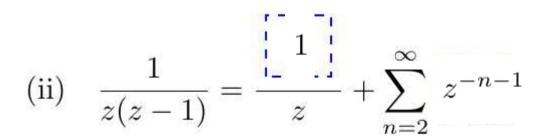
Build the Laurent expansion around z=0 for the function

$$rac{1}{z\left(z-1
ight)}$$

for the region: (i) $|z| \in (0,1)$ and ii) $|z| \in (1,\infty)$.

(i)
$$\frac{1}{z(z-1)} = \frac{\left|-1\right|}{z} - \sum_{n=0}^{\infty} \left|z^n\right|$$

$$\begin{bmatrix} -2 & -1 & 0 & 1 & 2 & z^n \end{bmatrix}$$



-2						
-2	-1	0	1	2	z^n	

×

Submit

You have used 3 of 6 attempts

Previous

Next >



Course

Progress

<u>Dates</u>

Discussion

Wiki

☆ Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Dedicated problems

< Previous

Next >

Problem 2.4

☐ Bookmark this page

Homework due Oct 31, 2020 20:00 EDT

Problem 2.4

1 point possible (graded)

Build the Laurent expansion for the function

$$\frac{z}{z^2 + 1}$$

around point z=i. What is the convergence region of the obtained result?

$$\left[\frac{1}{z-i} - \frac{i}{4} \sum_{n=0}^{\infty} \left(\left[\frac{1}{z-i} \right] \right)^n (z-i)^n, \quad |z-i| < \left[\frac{1}{z-i} \right] \right]$$

Submit

You have used 0 of 6 attempts

< Previous

Next >

© All Rights Reserved



edX

<u>About</u>

<u>Affiliates</u>

edX for Business

Open edX

<u>Careers</u>

<u>News</u>



Course <u>Progress</u>

<u>Dates</u>

Discussion

☆ Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Exercises

<u>Wiki</u>

Previous						Next :
Problem 2.						
Problem	2.5					
1/1 point (ung Consider the						
			1	$\frac{1}{z} + \frac{2z}{z^2 - \pi^2}.$		
Find the sing	gularity type a	at points $z=\pm$		$z = z^2 - \pi^2$		
	able simgula					
	abic siriigala	Tides.				
O Poles.						
Essent	ial singulariti	es.				
✓						
	You have us	ed 2 of 6 attempt	s			
✓	You have us	ed 2 of 6 attempt	S			
Submit	You have us t (1/1 point)	ed 2 of 6 attempt	S			
Submit		ed 2 of 6 attempt	S			
Submit		ed 2 of 6 attempt	S			

© All Rights Reserved



edX

About

<u>Affiliates</u>

edX for Business

Open edX

Careers

News

Legal

Terms of Service & Honor Code

Privacy Policy

Accessibility Policy

Trademark Policy

<u>Sitemap</u>

Connect

<u>Blog</u>

Contact Us

Help Center

Media Kit

Donate















© 2020 edX Inc. All rights reserved. 深圳市恒宇博科技有限公司 <u>粤ICP备17044299号-2</u>



Course

Progress

<u>Dates</u>

Discussion

Wiki

☆ Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Exercises

< Previous	Z ~	Z ~			Next >

Problem 2.6

☐ Bookmark this page

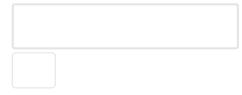
Problem 2.6

3 points possible (ungraded)

Compute the following integrals along contour C -- unit circle centered at z=0. Use pi for π and i for imaginary unity

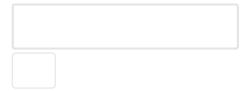
(1)

$$\int_C rac{ze^z}{ an z^2} dz$$



(2)

$$\int_C e^{-1/z} \sin\left(rac{1}{z}
ight) dz$$



(3)

$$\int_C \frac{e^z}{z^n} dz \quad \text{(for natural } n) = \frac{1}{\left(\begin{array}{c} 1 \\ 1 \\ 1 \end{array}\right)!}$$

	2	$2\pi i$	πi	n	n-1		
--	---	----------	---------	---	-----	--	--

Submit

You have used 0 of 6 attempts



<u>Help</u>

dougsweetser -

Course

Progress

<u>Dates</u>

Discussion

<u>Wiki</u>

* Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Exercises

4.5	 	 	 	
< Previous				Next >

Problem 2.7

☐ Bookmark this page

Problem 2.7

2 points possible (ungraded)

Find all the isolated singularities of the functions and define their type (assuming n is an integer).

1)
$$f(z) = \frac{\sin z}{1 - \tan z}$$

) simple poles at $z=rac{\pi}{4}+2\pi n$

 \bigcirc simple poles at $z=rac{\pi}{4}+\pi n$

 \bigcap simple poles at $z=rac{\pi}{4}+2\pi n$ and higher order poles at $z=rac{3\pi}{4}+2\pi n$

2)
$$f(z)=rac{e^{c/(z-a)}}{e^{z/a}-1}$$

) simple poles at $z=2\pi i n a$ and removable singularity at z=a

) simple poles at $z=2\pi i na$ and essential non-isolated singularity at z=a

 $\overline{}$ simple poles at $z=2\pi i n a$ and essential isolated singularity at z=a

) simple poles at $z=\pi i n a$ and essential isolated singularity at z=a

Submit

You have used 0 of 6 attempts

< Previous

Next >

© All Rights Reserved





Course

<u>Progress</u>

<u>Dates</u>

Discussion

<u>Wiki</u>

* Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Dedicated problems

Previous				Next
Problem 2.8				
Bookmark this page				
Homework due Problem 2.8	Oct 31, 2020 20:00 EDT			
2 points possible (§ Find coefficient i	graded) in front of $\frac{1}{z}$ of Laurent serie	s of the functions		
	~	$rac{\sinrac{1}{z}}{-z}, 2)\;g\left(z ight)=\exp\left(-\exp\left(-\exp\left(-rac{1}{z} ight) ight)$	$\binom{1}{2}$	
	$1) \ f(z) = \frac{1}{1}$	$\frac{-z}{-z}$, $z) g(z) = \exp\left(-\exp\left(-\frac{z}{z}\right)\right)$	$P\left(\frac{-}{z}\right)$	
at $z=0.$				
Coefficient in fro	ont of $rac{1}{z}$ for Laurent series of	$f\left(z ight)$		
Coefficient in fro	ont of $\frac{1}{z}$ for Laurent series of	a(z)		
Coemercia in inc	z for Eddiche series of	9 (~)		
Submit	ou have used 0 of 6 attempts			
	< Previous	Next >		

© All Rights Reserved



edX

About

Affiliates

edX for Business

Open edX



Course <u>Progress</u> <u>Dates</u> **Discussion** <u>Wiki</u>

Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Exercises

✓ Previous	Z ~	Z ~	*				Next >
Problem 2. ☐ Bookmark this							
	ble (ungraded)	type of the fu	nction $ze^{rac{1}{z}}e^{-}$	$-rac{1}{z^2}$ at point z	= 0:		
Non-is	solated singula	arity.					
Essen	tial isolated si	ngularity.					
Simple	e pole						
Highe	r-order pole						
Submit	You have us	ed 0 of 6 attemp	ots				
	⟨ Pr	evious		1	Next >		

© All Rights Reserved



edX

About

Affiliates

edX for Business

Open edX

Careers

<u>News</u>

Legal

Terms of Service & Honor Code

Privacy Policy



Course <u>Progress</u> <u>Dates</u> <u>Discussion</u> <u>Wiki</u>

☆ Course / 2. Cauchy theorem. Types of singularities. Laurent and Taylor series. / Exercises

	E ~		Z ~		ď			Next >
roblem 2	10							
Bookmark this								
Problem	. 2 10							
2 points poss Function	sible (ungraded)							
				e^{iz}				
				$\overline{\cos z - 1}$				
can be exp	anded into Lau	ırent series \sum	$\sum_{n=-\infty}^{\infty} c_n z^n$ i	in the region $ z $	$ x \in (2\pi k, 2\pi$	$(k+1))$ for δ	any integer no	on
negative k .	Find coefficier			k=0 and $k=0$				
c_{-3} for k =	= 0							
c_{-3} for k =	= 1							
c_{-3} for $k=$	= 1							
c_{-3} for $k=$	= 1							
c_{-3} for $k=$	= 1							
c_{-3} for $k=$	= 1							
c_{-3} for $k=1$		ed 0 of 6 attemp	ots					
		ed 0 of 6 attemp	ots					
		ed 0 of 6 attemp	ots					
		ed 0 of 6 attemp	ots					
		ed 0 of 6 attemp	ots					

© All Rights Reserved



edX

<u>About</u>

<u>Affiliates</u>

edX for Business

Open edX

Careers