Analytic And Computations

Theorems	Analytic	Computations	Computations2	Others
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400

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Theorems for 100.

State **Cauchy Integral Formula Formula**

a $$\frac{n!}{2\pi i}\int_C \frac{f(z)}{(z-z_0)^{n+1}}\,dz = f^{(n)}(z_0)$$

b $$\frac{2\pi i}{n!}\int_C \frac{f(z)}{(z-z_0)^{n}}\,dz = f^{(n)}(z_0)$$

c $$\int_C \frac{f(z)}{(z-z_0)^{n}}\,dz = \frac{2\pi i}{n!} f^{(n)}(z_0)$$

d $$\int_C \frac{f(z)}{(z-z_0)^{n+1}}\,dz = \frac{n!}{2\pi i} f^{(n)}(z_0)$$

e none of them

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Theorems for 200.

What does **Cauchy-Goursat** say?

a f analytic, C simple, then $\int_C f(z)\,dz = 0$

b f analytic, C simple, then $\int_C f(z)\,dz > 0$

c f analytic, C closed, then $\int_C f(z)\,dz < 0$

d f analytic, C simple and closed, then $\int_C f(z)\,dz = 0$

e f continuous, C Jordan, then $\int_C f(z)\,dz = 0$

f f bounded, C Jordan, then $\int_C f(z)\,dz = 0$

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Theorems for 300.

Louville's Theorem states that

a. Any polynomial has no real roots.

b. Any polynomial has a real root.

c. Any polynomial with complex coefficients has a real root.

d. Any polynomial with complex coefficients has no complex roots.

e. Any polynomial with complex coefficients has at least a complex root.

f. Any polynomial with real coefficients has at least one complex root.

g. none of above

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Theorems for 400.

De Moivre formula The roots of $z^n = re^{i\theta}$ are $z_k =$

a $r^{1/k}\left[\cos\left(\frac{\theta+2\pi n}{k}\right)+i\sin\left(\frac{\theta+2\pi k}{n}\right)\right], \quad k=1,..,n$

b $r^{1/k}\left[\cos\left(\frac{\theta-2\pi k}{n}\right)+i\sin\left(\frac{\theta+2\pi k}{n}\right)\right], \quad k=1,..,n$

c $r\left[\cos\left(\frac{\theta+2\pi n}{k}\right)+i\sin\left(\frac{\theta+2\pi k}{n}\right)\right], \quad k=1,..,n$

d $r^{1/k}\left[\cos\left(\frac{\theta+2\pi k}{n}\right)+i\sin\left(\frac{\theta+2\pi k}{n}\right)\right], \quad k=0,..,n-1$

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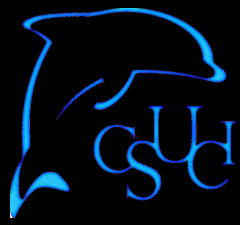
e none of them



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Analytic for 100.

What are the Cauchy Riemann Equations for $f = u + iv$?

a $v_\theta = ru_r, \quad u_\theta = -rv_r$

b $v_x = u_y, \quad v_y = -u_x$

c $v_y = u_x, \quad u_x = -v_y$

d $v_x = v_y, \quad u_x = -v_y$

e $v_x = v_y, \quad u_x = -u_y$

f none of them

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Analytic for 200.

What does **holomorphic** mean?

a. Analytic

b. $u_{xx} + u_{yy} = 0$

c. Continuous

d. Differentiable

e. $u_x = v_y$

f. There is a harmonic conjugate of v

g. none of them

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Analytic for 300.

What does **harmonic** mean?

a Analytic

b $u_x x + u_y y = 0$

c Continuous

d Differentiable

e $u_x = v_y$

f There is a harmonic conjugate of v

g none of them

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Analytic for 400.

The circle of radius 5 centered at $-i$ is

a	$\lvert z-i\rvert^2 = 5$
b	$\lvert z-i\rvert = 25$
c	$\lvert z-i\rvert^2 = 25$
d	$(x-i)^2 + (y-i)^2 = 25$
e	$\lvert z+i\rvert = 5$
f	$e^{5i} = \theta$
g	none of them

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Computations for 100.

A parametrization of the circle of radius 5 centered at $-i$ oriented positively is

a $z = 5e^{i\theta}, \quad \theta \in [0, \pi]$

b $z = e^{5i\theta}, \quad \theta \in [0, 2\pi]$

c $z = e^{-5i\theta}, \quad \theta \in [0, \pi]$

d $z = 5e^{i\theta}, \quad i \in [0, \pi]$

e $z = 5e^{i\theta}, \quad \pi \in [0, \theta]$

f $z = 5e^{i\theta}, \quad \theta \in [2\pi, 4\pi]$

g none of them

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Computations for 200.

For $z = re^{i\Theta}, \quad \Theta \in (-\pi, \pi)$ the Log of z is defined to be

a	$\ln r + i\Theta + 2\pi k, \quad k \in \mathbb{Z}$
b	$\ln r + i\Theta - 2\pi k, \quad k \in \mathbb{Z}$
c	$\ln r + i\Theta + \pi k, \quad k \in \mathbb{Z}$
d	$\ln r + i(\Theta + \pi k), \quad k \in \mathbb{Z}$
e	$\ln r + 2i(\Theta + \pi k), \quad k \in \mathbb{Z}$
f	$\ln r + i\Theta$
g	none of them

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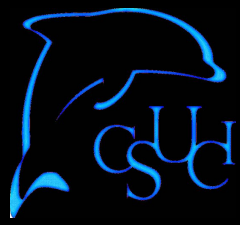

Computations for 300.

For $z = re^{i\Theta}, \quad \Theta \in (-\pi, \pi)$ the $\log(z)$ is defined to be

a	$\ln r + i(\Theta + 2\pi k), \quad k \in \mathbb{Z}$
b	$\ln r + i\Theta - 2\pi k, \quad k \in \mathbb{Z}$
c	$\ln r + i\Theta + \pi k, \quad k \in \mathbb{Z}$
d	$\ln r + i(\Theta + \pi k), \quad k \in \mathbb{Z}$
e	$\ln r + 2i(\Theta + \pi k), \quad k \in \mathbb{Z}$
f	$\ln r + i\Theta$
g	none of them

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Computations for 400.

Which number represents $e^{-3i\pi/2}$?

a $-i/2$

b $2/i$

c $i/1$

d $-i/1$

e $-1/2$

f $0/2$

g none of them

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Computations2 for 100.

Value of $e^{i\pi/2}$

a	i
b	1
c	-1
d	0
e	-i
f	none of them

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Computations2 for 200.

Value of i^{2009}

a i

b -i

c -1

d 0

e none of them

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Computations2 for 300.

Value of principal branch of $\sqrt{i}$

a	$\sqrt{2}/2 - i\sqrt{2}/2$
b	i
c	i^2
d	$\sqrt{2}/2 + i\sqrt{2}/2$
e	none of them

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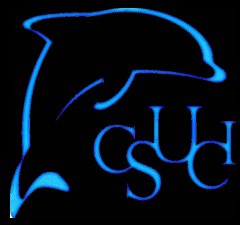

Computations2 for 400.

In hyperbolic functions?

a $\sinh^2 z + \cosh^2 z = 1$

b $\sinh^2 z - \cosh^2 z ==$

c $\sinh^2 z + \cosh^2 z = 2$

d $-\sinh^2 z + \cosh^2 z = 1$

e none of them

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Others for 100.

What is a singularity?

a. A rarity

b. Something singular

c. A point where a function is zero

d. A point for which there is a neighborhood where the function is analytical except at the point

e. A point where the function vanishes

f. A point where the function is discontinuous

g. none of them

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Others for 200.

What is a domain D?

a. Where the function is defined
b. Where the function is not zero
c. a set non-empty and connected
d. They usually tell me
e. Where I live
f. none of them

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Others for 300.

A function is entire if

a. it is not broken

b. it is analytic

c. it is not rational

d. it is differentiable everywhere

e. it is analytic on the complex plane

f. none of the above

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Others for 400.

What is the Laplace equation?

a $H_{xx}(x,y) + H_{yy}(x,y) = 0$

b $\int_C f\,dz = 0$

c $e^{i\theta} = \cos(\theta) + i\sin(\theta)$

d $\overline{f(z)} = f(\overline{z})$

e $e^{i} + 1 = 0$

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