[PRINT]

21S1 MH1810,
SCSE LEE CHUN YANG, 8/22/21 at 12:21:39 AM SGT

Question1: *Score 0.47/1*

Which of the following are true for all θ?

Your response	Correct response
Choice 2: $\sin 2\theta = 2\sin\theta\cos\theta$ Choice 7: $\cos(-\theta) = \cos\theta$	$cos^4(\theta) - \sin^4(\theta) = \cos(2\theta)$ $\sin 2\theta = 2\sin\theta\cos\theta$ $\cot^2\theta + 1 = \csc^2\theta$ $\frac{1}{1+\cos\theta} = \frac{1}{2}\sec^2\frac{\theta}{2}$ $\cos(-\theta) = \cos\theta$ $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta} = 2\sec^2\theta$ $\frac{1}{1-\cos\theta} = \frac{1}{2}\csc^2\frac{\theta}{2}$

Auto graded **Grade:** 0.29/1.0

Which of the following are true for all A and B?

Your response	Correct response
Choice 1: $\sin(A+B) = \sin A\cos B + \sin B\cos A$ Choice 2: $\cos(A+B) = \cos A\cos B - \sin A\sin B$ Choice 5: $\sin A + \sin B = 2\sin\frac{A+B}{2}\cos\frac{A-B}{2}$ Choice 6: $\cos A + \cos B = 2\cos\frac{A+B}{2}\cos\frac{A-B}{2}$	$\sin(A+B) = \sin A\cos B + \sin B\cos A$ $\cos(A+B) = \cos A\cos B - \sin A\sin B$ $\sin A + \sin B = 2\sin\frac{A+B}{2}\cos\frac{A-B}{2}$ $\cos A + \cos B = 2\cos\frac{A+B}{2}\cos\frac{A-B}{2}$ $\tan A + \tan B = \frac{\sin(A+B)}{\cos A\cos B}$ $\sin\left(\frac{\pi}{2} - A\right) = \cos A$

Auto graded **Grade:** 0.67/1.0

Total grade: 0.2857142857142857×1/2 + 0.6666666666666666×1/2 = 14% + 33%

Question2: *Score 0.2/1*

Given that A and B are in **the same quadrant**, $\sin A = \frac{3}{5}$ and $\cos B = -\frac{12}{13}$, then

Note : Give your answers in 2 decimal points.

1. $\cos A =$

Your response	Correct response
4/13	**-0.8±0.01**

Auto graded **Grade:** 0/1.0

- $\sin B =$

Your response	Correct response
5/13	**0.384615±0.01**

Auto graded **Grade:** 1/1.0

- $\tan A =$

Your response	Correct response
3/4	**-0.75±0.01**

Auto graded **Grade:** 0/1.0

- $\sin(A+B) =$

Your response	Correct response
-368/845	**-0.861538±0.01**

Auto graded **Grade:** 0/1.0

- $\cos(A-B) =$

Your response	Correct response
1/65	**0.969231±0.01**

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/5 + 1.0×1/5 + 0.0×1/5 + 0.0×1/5 + 0.0×1/5 = 0% + 20% + 0% + 0% + 0%

Question3: *Score 0.66/1*

Match the following graphs :

Note : The horizontal axis is the $x-$axis and the vertical axis is the $y-$axis.

Your response	Correct response
5 6 1 1 4 6	**5 3 2 1 4 6**

Auto graded **Grade:** 0.67/1.0

Total grade: 0.6666666666666666×1/1 = 67%

Question4: *Score 0/1*

Given that

$$\sum_{k=0}^{n-1} x^k = 1 + x + x^2 + x^3 + \cdots + x^{n-1} = \frac{1-x^n}{1-x}$$

for any real number x, and

$$\sum_{k=0}^{\infty} x^k = 1 + x + x^2 + x^3 \cdots = \frac{1}{1-x}$$

for $|x| < 1$.

By using the formulas above, simplify the following expressions.

Note : You need to key in * whenever multiplication is involved.

a) $1 + 5 + 5^2 + 5^3 + \cdots + 5^{26}$

Your response	Correct response
(1-5^26)/4	**1862645149230957031**

Auto graded **Grade:** 0/1.0

b) $0.\overline{22} = 0.222222\cdots$

Your response	Correct response
1/	**2/9**

Auto graded **Grade:** 0/1.0

c) $x^4 + x^3y + x^2y^2 + xy^3 + y^4$

Your response	Correct response
No answer	**x^4*(1-y^5/x^5)/(1-y/x)**

Auto graded **Grade:** 0/1.0

d) $1 - x + x^2 - x^3 + x^4 - x^5 + \cdots$ where $|x| < 1$

Your response	Correct response
No answer	**1/(1+x)**

Auto graded **Grade:** 0/1.0

e) $1 + 2x + 4x^2 + 8x^3 + \cdots$ where $|x| < \frac{1}{2}$

Your response	Correct response
No answer	**1/(1-2*x)**

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/5 + 0.0×1/5 + 0.0×1/5 + 0.0×1/5 + 0.0×1/5 = 0% + 0% + 0% + 0% + 0%

Question5: *Score 0/1*

Given that

$$\sum_{k=1}^{n} k = 1+2+3+4+\cdots+n = \frac{n(n+1)}{2}$$

and

$$\sum_{k=1}^{n} k^2 = 1^2+2^2+3^2+4^2+\cdots+n^2 = \frac{n(n+1)(2n+1)}{6}.$$

By using the formulas above, **compute** the following.

a) $10^2+11^2+12^2+\cdots+51^2$

Your response	Correct response
No answer	**45241**

Auto graded **Grade:** 0/1.0

b) $\left(29^2-29\right)+\left(30^2-30\right)+\left(31^2-31\right)+\left(32^2-32\right)+\cdots+\left(93^2-93\right)$

Your response	Correct response
No answer	**260780**

Auto graded **Grade:** 0/1.0

c) $2^2+4^2+6^2+\cdots+100^2$

Your response	Correct response
No answer	**171700**

Auto graded **Grade:** 0/1.0

d) $1^2-2^2+3^2-4^2+5^2-6^2+\cdots+145^2-146^2$

Your response	Correct response
No answer	**-10731**

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/4 + 0.0×1/4 + 0.0×1/4 + 0.0×1/4 = 0% + 0% + 0% + 0%

Question6: *Score 0/1*

Given that x and y are real numbers, solve the following equations.

Note :

- If the answer is "$x = 1$ or $x = 2$", input either 1;2 or 2;1 (seperate by **semicolon**)
- If the answer is "$x = 1$ and $y = 2$", input 1,2 (seperate by **comma**)

a) $(x-1)(x-2) = 2$

Your response	Correct response
No answer	**0;3**

Auto graded **Grade:** 0/1.0

b) $(x-2)^2 + (y-3)^2 = 0$

Your response	Correct response
No answer	**2,3**

Auto graded **Grade:** 0/1.0

c) $2|x| - |x+1| = 1$

Your response	Correct response
No answer	**2;-2/3**

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/3 + 0.0×1/3 + 0.0×1/3 = 0% + 0% + 0%

Question7: *Score 0/1*

Express the following as $a(x-b)^2 + k$:

Note : If the constant (a, b, or k) in the expression is not an integer, express it in fraction.

a) $x^2 + 4x + 10$

Your response	Correct response
No answer	**(x+2)^2+6**

Auto graded **Grade:** 0/1.0

b) $x^2 + 3x + 10$

Your response	Correct response
No answer	(x+3/2)^2+31/4

Auto graded **Grade:** 0/1.0

c) $10 - 4x - x^2$

Your response	Correct response
No answer	-(x+2)^2+14

Auto graded **Grade:** 0/1.0

d) $2x^2 + 6x + 7$

Your response	Correct response
No answer	2(x+3/2)^2+5/2

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/4 + 0.0×1/4 + 0.0×1/4 + 0.0×1/4 = 0% + 0% + 0% + 0%

Question8: *Score 0/1*

Express the following as partial fractions $\frac{A}{x+p} + \frac{B}{x+q}$, where $A > 0$.

a) $\frac{1}{(x+2)(x+3)}$, $A =$

Your response	Correct response
	1

Auto graded **Grade:** 0/1.0

, $B =$

Your response	Correct response
	-1

Auto graded **Grade:** 0/1.0

, $p =$

Your response	Correct response
	2

Auto graded **Grade:** 0/1.0

, $q =$

Your response	Correct response
	3

Auto graded **Grade:** 0/1.0

b) $\frac{1}{4x^2-9}$, $A=$

Your response	Correct response
	1/12

Auto graded **Grade:** 0/1.0

, $B=$

Your response	Correct response
	-1/12

Auto graded **Grade:** 0/1.0

, $p=$

Your response	Correct response
	-3/2

Auto graded **Grade:** 0/1.0

, $q=$

Your response	Correct response
	3/2

Auto graded **Grade:** 0/1.0

c) $\frac{1}{x^2+4x+3}$, $A=$

Your response	Correct response
	1/2

Auto graded **Grade:** 0/1.0

, $B=$

Your response	Correct response
	-1/2

Auto graded **Grade:** 0/1.0

, $p=$

Your response	Correct response
	1

Auto graded **Grade:** 0/1.0

, $q=$

Your response	Correct response
	3

Auto graded **Grade:** 0/1.0

d) $\frac{1}{2x^2+3x+1}$, $A=$

Your response	Correct response
	1

Auto graded **Grade:** 0/1.0

, $B=$

Your response	Correct response
	-1

Auto graded **Grade:** 0/1.0

, $p=$

Your response	Correct response

	1/2

Auto graded **Grade:** 0/1.0

, $q =$

Your response	Correct response
	1

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 + 0.0×1/16 = 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0% + 0%

Question9: *Score 0/1*

Find the equation of the following lines. Express your answer in the form of $y = mx + c$

a) A line that passes through $(1, 2)$ and $(3, 4)$.

Your response	Correct response
No answer	**y = x+1**

Auto graded **Grade:** 0/1.0

b) A line that passes through $(1, 4)$ and has gradient 3.

Your response	Correct response
No answer	**y=3x+1**

Auto graded **Grade:** 0/1.0

c) A line that passes through $(1, 1)$ and is perpendicular to the line with equation $y = 2x + 1$.

Your response	Correct response
No answer	**y=-x/2+3/2**

Auto graded **Grade:** 0/1.0

d) A horizontal line that passes through $(2, -2)$

Your response	Correct response
No answer	**y=-2**

Auto graded **Grade:** 0/1.0

e) A line that passes through $(\sqrt{3}, 1)$ and intersects the x-axis at 30° (counter-clockwise).

Your response	Correct response

No answer	y = x/sqrt(3)

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/5 + 0.0×1/5 + 0.0×1/5 + 0.0×1/5 + 0.0×1/5 = 0% + 0% + 0% + 0% + 0%

Question10: *Score 0/1*

a) $x^2 - 1 =$

Your response	Correct response
	$(x-1)(x+1)$

Auto graded **Grade:** 0/1.0

b) $x^2 + 1 =$

Your response	Correct response
	None of the above

Auto graded **Grade:** 0/1.0

c) $x^3 - 1 =$

Your response	Correct response
	$(x-1)\left(x^2+x+1\right)$

Auto graded **Grade:** 0/1.0

d) $x^4 - 1 =$

Your response	Correct response
	$(x-1)(x+1)\left(x^2+1\right)$

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/4 + 0.0×1/4 + 0.0×1/4 + 0.0×1/4 = 0% + 0% + 0% + 0%

Question11: *Score 0/1*

Given that

$$f(x) = 2x + 1 \quad \text{and} \quad g(x) = 2 + \frac{8}{x}.$$

a) Find $f(g(x))$.

$f(g(x)) =$

Your response	Correct response
No answer	**5 + 16/x**

Auto graded **Grade:** 0/1.0

b) Find $g^{-1}(x)$.

$g^{-1}(x) =$

Your response	Correct response
No answer	**-8/(2-x)**

Auto graded **Grade:** 0/1.0

c) Suppose that

$$h\left(2+\frac{8}{x}\right)=4+\frac{64}{x^2},$$

find $h(x)$.

$h(x)$ =

Your response	Correct response
No answer	**x^2 - 4* x + 8**

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/3 + 0.0×1/3 + 0.0×1/3 = 0% + 0% + 0%

Question12: *Score 0/1*

Consider a function

$$f(x)=x^2+12x+20, \quad x\le m$$

Given that f is invertible.

a) Find the largest possible value of m.

$m =$

Your response	Correct response
No answer	**-6**

Auto graded **Grade:** 0/1.0

b) With the value m in part (a), find $f^{-1}(x)$.

$f^{-1}(x) =$

Your response	Correct response
No answer	**-6 - 1/2 * sqrt(4x+64)**

Auto graded **Grade:** 0/1.0

c) Suppose that the domain of $f^{-1}(x)$ is $\{x|x \geq c\}$. With the value m in part (a), find c.

$c =$

Your response	Correct response
No answer	-16

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/3 + 0.0×1/3 + 0.0×1/3 = 0% + 0% + 0%

Question13: *Score 0/1*

a) Given that $-10 \leq k \leq 10$ and k is an integer. How many possible integers k so that the following function has no roots?

- $f(x) = x^2 + 4x + k$

  The number of possible interger(s) k is

Your response	Correct response
	6

Auto graded **Grade:** 0/1.0

- $g(x) = x^2 + kx + 4$

  The number of possible interger(s) k is

Your response	Correct response
	7

Auto graded **Grade:** 0/1.0

- $h(x) = kx^2 + x + 4$

  The number of possible interger(s) k is

Your response	Correct response
	10

Auto graded **Grade:** 0/1.0

b) Given that $-10 \leq k \leq 10$ and k is an integer. How many possible integers k so that the following function has **exactly** one root?

- $f(x) = x^2 + 4x + k$

  The number of possible interger(s) k is

Your response	Correct response
	1

Auto graded **Grade:** 0/1.0

- $g(x) = x^2 + kx + 4$

  The number of possible interger(s) k is

Your response	Correct response
	2

Auto graded **Grade:** 0/1.0

- $h(x) = kx^2 + x + 4$

  The number of possible interger(s) k is

Your response	Correct response
	1

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/6 + 0.0×1/6 + 0.0×1/6 + 0.0×1/6 + 0.0×1/6 + 0.0×1/6 = 0% + 0% + 0% + 0% + 0% + 0%

Question14: *Score 0/1*

Given that $-10 \leq k \leq 10$ and k is an integer. How many possible integers k so that the following inequality holds?

- $(k-3)(k-6) > 0$

  The number of possible k is

Your response	Correct response
	17

Auto graded **Grade:** 0/1.0

- $\frac{k-4}{k+6} \leq 1$

  The number of possible k is

Your response	Correct response
	16

Auto graded **Grade:** 0/1.0

- $|k-1|(k-6) \leq -6$

  The number of possible k is

Your response	Correct response
	13

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/3 + 0.0×1/3 + 0.0×1/3 = 0% + 0% + 0%

Question15: *Score 0/1*

Remainder Theorem

Suppose p is a polynomial of degree at least 1 and c is a constant. If $p(x)$ is divided by $(x-c)$, then the remainder is $p(c)$.

Factor Theorem

Suppose p is a nonzero polynomial. The real number c is a zero (or root) of p if and only if $(x-c)$ is a factor of $p(x)$.

a) Suppose x^3+ax+a and ax^2+2x+1 give the same remainder when both are divided by $x-2$. Find a.

$a=$

Your response	Correct response
	3

Auto graded **Grade:** 0/1.0

b) Suppose $x-1$ is a factor of $x^4+5x^3+16x^2+ax+a$. Find a.

$a=$

Your response	Correct response
	-11

Auto graded **Grade:** 0/1.0

c) Suppose f is a polynomial that satisfies

- When $f(x)$ is divided by $(x-1)$, the remainder is 2.
- When $f(x)$ is divided by $(x-2)$, the remainder is 15.

Find the remainder when $f(x)$ is divided by $(x-1)(x-2)$.

The remainder is

Your response	Correct response
No answer	**13*x - 11**

Auto graded **Grade:** 0/1.0

Total grade: 0.0×1/3 + 0.0×1/3 + 0.0×1/3 = 0% + 0% + 0%