

Solomon Practice Paper

Pure Mathematics 4G

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	7	
2	7	
3	9	
4	11	
5	12	
6	12	
7	17	
Total:	75	

How I can achieve better:

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Last updated: May 5, 2023



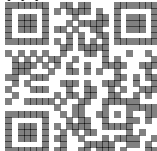
2. Show that the sum of the first n terms of the series

[7]

$$5^2 + 9^2 + 13^2 + 17^2 + \dots$$

is given by $\frac{1}{3}n(16n^2 + 36n + 23)$.

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3.

$$f(x) \equiv x^3 - 5x^2 + 2.$$

- (a) Show that the equation $f(x) = 0$ has a root α in the interval $[0, 1]$. [2]
- (b) Use the Newton-Raphson method with initial value $x = 0.5$ to find a value for α which is correct to 2 decimal places. [5]
- (c) Give a reason why the Newton-Raphson method fails if an initial value of $x = 0$ is used in part (b). [2]

Total: 9

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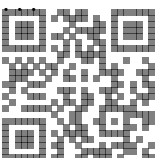
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4. The complex number z is given by

$$z = \frac{1 + i\sqrt{3}}{1 - i\sqrt{3}}$$

- (a) Show that z can be expressed in the form $\lambda(1 - i\sqrt{3})$ where λ is a rational number which you should find. [4]
- (b) Find the modulus and argument of z . [3]
- (c) Hence, or otherwise, find the modulus and argument of [4]

$$\left(\frac{1 + i\sqrt{3}}{1 - i\sqrt{3}}\right)^4$$

Total: 11

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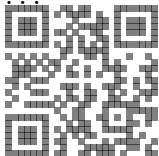
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6. (a) Show that

[3]

$$\int 2 \cot(x) dx = \ln (\sin^2(x)) + c,$$

where c is an arbitrary constant.

(b) Find the general solution of the differential equation

[5]

$$\sin(x) \frac{dy}{dx} + 2y \cos(x) = 1.$$

Given that $y = 0$ when $x = \frac{\pi}{4}$,

(c) show that when $x = \frac{\pi}{3}$,

[4]

$$y = \frac{2}{3} (\sqrt{2} - 1).$$

Total: 12

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