

Solomon Practice Paper

Pure Mathematics 6B

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

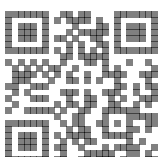
Question	Points	Score
1	5	
2	5	
3	5	
4	6	
5	11	
6	12	
7	14	
8	17	
Total:	75	

How I can achieve better:

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Last updated: May 5, 2023



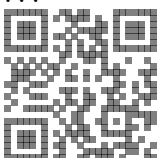
5.

$$\mathbf{M} = \begin{pmatrix} 1 & 2 & -1 \\ 0 & 1 & -4 \\ x & 3 & -1 \end{pmatrix}.$$

- (a) Given that $\lambda = -1$ is an eigenvalue of \mathbf{M} , find the value of x . [3]
- (b) Show that $\lambda = -1$ is the only real eigenvalue of \mathbf{M} . [6]
- (c) Find an eigenvector corresponding to the eigenvalue $\lambda = -1$. [2]

Total: 11

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6. A student is looking at different methods of solving the differential equation

$$\frac{dy}{dx} = xy, \quad y = 1 \text{ when } x = 0.2.$$

The first method the student tries is to use the approximation

$$\left(\frac{dy}{dx}\right)_0 \approx \frac{y_1 - y_0}{h}$$

twice with a step length of 0.1 to obtain an estimate for y at $x = 0.4$.

(a) Find the value of the student's estimate for y at $x = 0.4$. [6]

The student then realises that the exact value of y at $x = 0.4$ can be found using integration.

(b) Use integration to find the exact value of y at $x = 0.4$. [4]

(c) Find, correct to 1 decimal place, the percentage error in the estimated value in part (a). [2]

Total: 12

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