

MA122 Mock Exam

Answers

(Full Solutions will NOT be posted;
use the MAC's drop-in help centre if you have any questions.)

**** Please remember that the mock test was meant as a means of providing an extra set of practice questions and basis for a review class. Do not study for the midterm based solely on the topics covered by the mock test! Go back through notes/labs/homework to ensure you have reviewed all concepts discussed in the course.

$$1. A^{-1} = \begin{bmatrix} \frac{1}{6} & -\frac{1}{4} & -\frac{5}{12} \\ \frac{1}{3} & 0 & \frac{1}{6} \\ \frac{1}{6} & -\frac{1}{4} & \frac{1}{12} \end{bmatrix}$$

2. $a = 1$

3. —

4. —

5. —

6. (a) $\cos A = \frac{9}{\sqrt{902}}$ (b) $Area = \sqrt{821}$ units²

7. $l: x = 2 + 3t, y = 1 + 4t, z = -t, t \in \mathbb{R}$ (different representations exist); $\left(\frac{1}{2}, -1, \frac{1}{2}\right)$

8. (a) $\pi: x + y - 2z = 9$ (or any scalar multiple) (b) π_0 is parallel to l

9. does not span

10. (a) — (b) $(1, 2, 3, 4) = \frac{1}{3}(3, 0, -3, 6) + 2(0, 2, 3, 1) + (0, -2, -2, 0)$

11. (a) Domain: \mathbb{R}^4 ; Codomain: \mathbb{R}^3 (b) (i) $(-1, 0, 7)$ (ii) not possible

$$12. (a) [S] = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 1 \\ 0 & -1 & 0 \end{bmatrix}, [T] = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, [S \circ T] = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & -1 & 0 \end{bmatrix}$$

(b) show $\det[S] \neq 0$ (b) $S^{-1}(w_1, w_2, w_3) = (-w_1 + w_2 + w_3, -w_3, w_1)$

13. (a) $\vec{0} = (1, 1)$ (b) $-(3, 4) = \left(\frac{1}{3}, \frac{1}{4}\right)$; $-(1, 0)$ does not exist (c) No, as Axiom 5 fails

14. A is a subspace

$$15. P = \begin{bmatrix} 1 & -1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, D = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix} \quad (\text{variations exist})$$