Nanyang Technological University

MH1810 MATHEMATICS 1

Mock Midterm Test (10 Questions)

Name:	Matric Number:	Tutorial Group:

This mock test only shows the format of questions that will be asked in the Midterm (which is longer with 20 questions/50 mins). It does not reflect the level of difficulty, nor suggest the type of questions to be asked.

Instructions: Write the answers in the boxes provided. You are not required to write down the working. Only answers in the boxes will be marked.

1. Find the complex number z satisfying |z| = 1 and Re(z) = Im(z) > 0.

Answer: $\frac{\sqrt{2}}{2} + 2\sqrt{\frac{5}{2}}$

$$\int_{1}^{2} a^{2} + b^{2}$$

2. Find the smallest positive integer n such that $(-1+i)^n$ a real number.

Answer: 4

3. For any real numbers n and m, consider

 $\mathbf{u} = \begin{pmatrix} 1 \\ 2 \\ n \end{pmatrix} \quad \text{and} \quad \mathbf{v} = \begin{pmatrix} 2 \\ m+2n-4 \end{pmatrix}.$ If **u** is parallel to **v**, find *n* and *m*.

Answer: $n = \begin{bmatrix} 2 \\ m \end{bmatrix}$ and $m = \begin{bmatrix} 2 \\ m \end{bmatrix}$ $0 = \begin{bmatrix} 2 \\ m \end{bmatrix}$

4. Find the distance between the planes $\mathbf{r} \cdot (0, 3, -4) = -10$ and $\mathbf{r} \cdot (0, -6, 8) = -10$.

7c: \[\begin{pmatrix} 6 & 1 \\ 2 & -1 \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	$\frac{-8}{-2} = 4$
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5. Find x and y such that

$$\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6 \\ 2 \end{pmatrix}.$$

 $\mathbf{Answer}: x =$

and y =

6. Find the determinant of the matrix

$$\begin{pmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 3 & 0 & 0 & 1 \end{pmatrix}.$$

Answer:

7. Evaluate the limit

$$\lim_{x \to 2} \frac{x^3 - 8}{x - 2 + \sqrt{x - 2}} \cdot \frac{2^{x - 2} - \sqrt{x - 2}}{2^{x - 2} - \sqrt{x - 2}} = \frac{(x^{\frac{1}{2} - \frac{1}{2}})^{(x - 2)^2 - x + 2}}{(x - 2)^2 - x + 2} = \frac{x^2 + 2x + 4}{x^2 + 2x + 4} =$$

Answer:

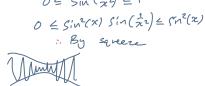


8. Evaluate the limit

$$\lim_{x \to 0} \sin^2(x) \sin\left(\frac{1}{x^2}\right).$$

 $Sin^{2}(x) Sin(\frac{1}{2x^{2}})$ $O \subset \frac{1}{x^{2}} \leq 1$ $Sin^{2}(x) Sin(\frac{1}{2}) \leq 1$

Answer:



9. Find the largest possible number a such that the function $\{(x) \notin (x) \neq 0\}$

$$f(x) = \frac{x + \sin(x)}{a + \sin(x)} \qquad \text{where } a = 0$$

is not continuous.

Answer:

10. Find the range of the function $f(x) = \sin(g(x))$ if g is a continuous function and the range of g is $[0, \pi]$.

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Answer: