

Math 152 Sec S07N01 Test 3 – Apr 5 2007

name (printed)

student number

**I have read and understood
the instructions below:**

signature

Instructions:

1. No notes or books are to be used in this test. If you need scrap paper please ask and some will be provided. Refer to the last page for a list of formulas.
2. A non-programmable, non-graphing calculator is permitted.
3. There are 7 pages (including this cover page) in the test. Justify every answer, and clearly show your work. Unsupported answers will receive no credit.
4. You will be given 50 minutes to write this test. Read over the test before you begin.
5. At the end of the test you will be given the instruction "Put away all writing implements and remain seated." *Continuing to write after this instruction will be considered as cheating.*
6. **Academic dishonesty:** Exposing your paper to another student, copying material from another student, or representing your work as that of another student constitutes academic dishonesty. Cases of academic dishonesty may lead to a zero grade in the test, a zero grade in the course, and other measures, such as suspension from this university.

Question	value	score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

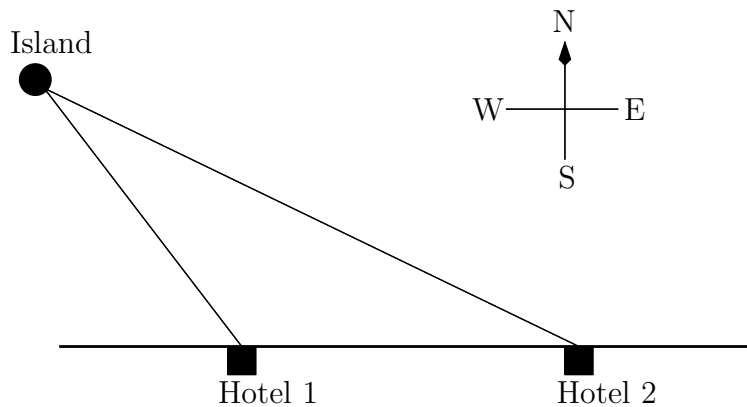
Question 1:

(a)[5 points] Solve the triangle with sides $a = 5$, $c = 2$ and angle $C = 23^\circ$. Note that there may be more than one solution. Round answers to two decimal places.

(b)[5 points] Solve the triangle with sides $a = 3.3$, $b = 2.7$ and $c = 2.8$. Round answers to two decimal places.

Question 2 [10 points]

Two oceanfront hotels are located on a long straight beach running east to west as shown in the figure below. An island is visible from both hotels. From the first hotel, the island is at a compass bearing of 315° , and the ferry from the hotel to the island takes 15 minutes to make the trip. From the second hotel, the island is at a compass bearing of 290° , and the ferry from the hotel to the island takes 20 minutes to make the trip. If the ferry travels at 12 km/hr, what is the distance between the two hotels? Round your answer to one decimal place.



Question 3 [10 points]

Solve the following system of equations using Gauss-Jordan elimination:

$$\begin{aligned}2x - 4y &= -14 \\-3x + y - 6z &= 4 \\-2x - 3y - 8z &= -10\end{aligned}$$

Question 4

(a)[3 points] Express the system

$$\begin{aligned} -\frac{1}{2}x + \frac{1}{3}y &= 4 \\ 3x + 2y &= -7 \end{aligned}$$

in matrix form $\mathbf{AX} = \mathbf{b}$ where \mathbf{A} is the coefficient matrix, $\mathbf{X} = \begin{bmatrix} x \\ y \end{bmatrix}$, and \mathbf{b} is an appropriate matrix with entries the right hand side of the system above.

(b)[4 points] Find \mathbf{A}^{-1}

(c)[3 points] Use your result in (b) to solve the system in (a).

Question 5 Let

$$\mathbf{A} = \begin{bmatrix} 1 & 3 \\ -2 & 0 \\ 1 & -1 \end{bmatrix}, \quad \mathbf{B} = \begin{bmatrix} -2 & 0 \\ -1 & 5 \end{bmatrix}, \quad \mathbf{C} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}, \quad \mathbf{D} = \begin{bmatrix} 2 & 1 \\ 1 & 0 \\ 3 & -1 \end{bmatrix}, \quad \mathbf{E} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

(a)[3 points] Compute

$$-2\mathbf{A} + 3\mathbf{D}$$

(b)[4 points] Compute

$$\mathbf{AB} - \mathbf{D}$$

(c)[3 points] Compute

$$\mathbf{IEABCI}$$

You may find some of the following formulas useful:

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

$$c^2 = a^2 + b^2 - 2ab \cos(C)$$

$$\sin^2(A) + \cos^2(A) = 1$$

$$\sin(A + B) = \sin(A) \cos(B) + \cos(A) \sin(B)$$

$$\sin(A - B) = \sin(A) \cos(B) - \cos(A) \sin(B)$$

$$\cos(A + B) = \cos(A) \cos(B) - \sin(A) \sin(B)$$

$$\cos(A - B) = \cos(A) \cos(B) + \sin(A) \sin(B)$$

$$\sin(2A) = 2 \sin(A) \cos(A)$$

$$\cos(2A) = \cos^2(A) - \sin^2(A)$$

$$\cos(2A) = 1 - 2 \sin^2(A)$$

$$\cos(2A) = 2 \cos^2(A) - 1$$

$$\sin(A/2) = \pm \sqrt{\frac{1 - \cos(2A)}{2}}$$

$$\cos(A/2) = \pm \sqrt{\frac{1 + \cos(2A)}{2}}$$