MONASH University

FACULTY OF INFORMATION TECHNOLOGY

FIT1047 Introduction to computer systems, networks and security – S2 2024

Assignment 3 – Networks

Purpose	Students will record data from a real-world wireless network and demonstrate that they can analyse it, identify its properties and potential issues. Students also need to analyse Internet traffic and identify servers, clients and protocols used. The assignment is related to Unit Learning Outcomes 5 and 6.
Your task	Part 1a: Submit your reflections. Part 1b: You need to submit a report with your findings regarding the analysis tasks. The instructions below contain concrete questions you should answer in your report. Part 2: In-Person quiz via Moodle. (More details will be provided later in Moodle.)
Value	**30**% of your total marks for the unit (10% for Part 1; 20% for Part 2) The assignment is marked out of 50 marks.
Word Limit	600 words for Task 1.2, no word limits for the remaining tasks
Due Date	**Part 1a & 1b - Moodle submission: 11:55 PM Friday 20 September 2024** **Part 2 - In-person quiz: Week 12 Your Officially Allocated Applied Session**
Submission	● Via Moodle assignment submission (Part 1a & 1b) - 2 pdf files (one for each part) ● Turnitin will be used for similarity checking of all submissions. ● **Via Moodle quiz submission (Part 2) during your allocated Officially Applied Session in Week 12 (in-person attendance required)** ● In this assessment, you must **not** use generative artificial intelligence (AI) to generate any materials or content in relation to the assessment task.
Assessment Criteria	See rubric
Late Penalties	● 5% deduction per calendar day or part thereof for up to one week ● Submissions more than 7 calendar days after the due date will receive a mark of zero (0) and no assessment feedback will be provided.
Support Resources	See Moodle Assessment page
Feedback	Feedback will be provided on student work via: ● general cohort performance ● specific student feedback ten working days post submission

院系
信息
技术

FIT1047 计算机系统、网络和安全简介 – S2 2024

作业 3 – 网络

目的	学生将记录来自真实世界无线网络的数据并证明 他们可以对其进行分析，识别其属性和潜在问题。学生还需要分析互联网流量并识别所使用的服务器、客户端和协议。 该作业与单元学习成果 5 和 6 相关。
您的任务	第 1a 部分：提交您的想法。 第 1b 部分：您需要提交一份报告，其中包含有关分析任务的发现。以下说明包含您应在报告中回答的具体问题。第 2 部分：通过 Moodle 进行现场测验。 （稍后将在 Moodle 中提供更多详细信息。）
占该单元总分的 30%（第 1 部分为 10%；第 2 部分为 20%） 作业满分为 50 分。	
任务 1.2 字数限制 600 字，其余任务无字数限制	
截止日期	第 1a 和 1b 部分 - Moodle 提交：2024 年 9 月 20 日星期五晚上 11:55 第 2 部分 - 现场测验：第 12 周您的正式分配的申请课程
提交	● 通过 Moodle 作业提交（第 1a 和 1b 部分）- 2 个 pdf 文件（其中一个用于各部分） ● Turnitin 将用于对所有提交的内容进行相似性检查。 ● 在第 12 周分配的正式申请课程期间通过 Moodle 测验提交（第 2 部分）（需要亲自出席） ● 在本次评估中，您不得使用生成式人工智能（AI）生成任何与评估任务相关的材料或内容。
评估标准	参见标题
逾期罚款	● 每个日历日或其部分时间扣除 5%，最多一周 ● 截止日期后超过 7 个日历日提交的内容将获得零 (0) 分，并且不会提供评估反馈。
支持资源	请参阅 Moodle 评估页面
反馈	学生作业的反馈将通过以下方式提供： ● 一般队列表现 ● 具体学生反馈提交后十个工作日

INSTRUCTIONS

Part 1a: Reflection (Hurdle - you MUST submit it in order to pass this assignment!)

Complete your reflection activities in **Week 7 to Week 9** Ed Lesson and copy/paste them into a pdf file. **Each week the reflection must have at least 100 words** (relevant and meaningful to the specific week).

Failure to submit all relevant week's reflections (missing all submissions or incomplete submissions) will result in your assignment 1 having a maximum mark of 49% only. For example, if the overall combined mark is 61/100, it will be scaled to 49/100. If the overall combined mark is 44/100 then it will remain as 44/100.

You may use this template:
https://docs.google.com/document/d/18UIEJQeyarYW1pl8oDEaf--ubCdJ5LDf-9_jSLbGxrE/edit?usp=sharing to write down your reflection.

Submit your reflection for this part (Part 1a) as a PDF file in Moodle.

Part 1b: WLAN Network Design and Security (25 marks)

For this part of the assignment, you will perform a real-world WLAN site survey. Your task is to produce a map of part of a building that gives an overview of the wireless networks that are available, as well as an analysis of the network.

What you will need: a WiFi-enabled laptop (some smartphones also work, see below), and a place to scan. You have to perform a survey of parts of the Monash Clayton / Malaysian campus.

You have to complete two tasks (a survey and a report).

Task 1.1: Survey (9 marks)

For Australian campus cohort:
Create a map[1] and survey of (a part of) the following building on our Clayton Campus:

- Students with student number ending with "0": Hargrave Andrew Library
- Students with student number ending with "1": Sir Louis Matheson Library

[1] An example map is given in the Appendix A. You may use any drawing tool to create a map (excluding heatmap generated by survey tools) or reuse existing floor plans with reference.

指示

第 1a 部分：反思（障碍 - 您必须提交它才能通过此作业！）

完成第 7 周至第 9 周教育课中的反思活动并复制/粘贴它们
转换为 pdf 文件。每周反思必须至少有 100 个单词（与特定周相关且有意义）。

未能提交所有相关周的反思（遗漏所有提交或提交不完整）将导致您的作业 1 的最高分为

仅49%。例如，如果总体组合分数为 61/100，则它将缩放为 49/100。如果总分是 44/100，那么它将保持为 44/100。

您可以使用此模板：https://docs.google.com/document/d/18UIEJQeyarYW1pl8oDEaf--ubCdJ5LDf-9_jSLbGxrE/e dit?usp=sharing 写下您的想法。

在 Moodle 中以 PDF 文件形式提交您对此部分（第 1a 部分）的思考。

第 1b 部分：WLAN 网络设计和安全（25 分）

对于这部分作业，您将执行实际的 WLAN 站点调查。您的任务是制作建筑物部分的地图，概述可用的无线网络，并对网络进行分析。

您将需要：一台支持 WiFi 的笔记本电脑（某些智能手机也可以使用，见下文）和一个扫描位置。您必须对莫纳什克莱顿/马来西亚校区的部分区域进行调查。

您必须完成两项任务（调查和报告）。

任务 1.1：调查（9 分）

对于澳大利亚校园学生：
创建克莱顿校区以下建筑（的一部分）的地图和调查：

- 学号以“0”结尾的学生：哈格雷夫·安德鲁图书馆
- 学号以“1”结尾的学生：路易斯·马西森爵士图书馆

1 附录 A 中给出了示例地图。您可以使用任何绘图工具创建地图（不包括测量工具生成的热图）或参考重复使用现有平面图。

- Students with student number ending with “2”: Learning and Teaching Building
- Students with student number ending with “3”: Menzies Building
- Students with student number ending with “4”: David Derham Law Building
- Students with student number ending with “5”: Learning Village
- Students with student number ending with “6”: Biomedical Learning and Teaching (BLTB)
- Students with student number ending with “7”: Mathematics & EAE
- Students with student number ending with “8”: Campus Centre
- Students with student number ending with “9”: Woodside Building

(You can find the location of the building here - Choosing Clayton campus)

For Malaysian campus cohort:
Create a map[1] and survey of (a part of) any building of your own choice on our Malaysian Campus.

(You can find the location of the building here - Choosing Kuala Lumpur campus)

A simple floor plan will be sufficient, it does not have to be perfectly to scale. See Appendix A for an example. You may also use the Monash digital map as a basis. The map should be labelled with all relevant information (e.g. dimensions, doors, walls and material such as wood or concrete or glass, if used for the discussion). **Your survey should cover an area of at least 60 square metres** (***e.g. 6x10 metres, or 4x15, or two storeys of 6x5 each***). Be sure to take the analysis in Task 1.2 into account, by designing your survey to include walls, doors etc. it will be easier to write something interesting in Task 1.2.

Furthermore, your survey must include at least three WiFi access points (APs). If you want, you can create an additional AP with your phone (using “Personal hotspot” or “Tethering” features).

For the survey, use a WLAN sniffing tool (see below) in at least eight different locations on your map. For each location, record[2] the technical characteristics of all visible APs. Depending on the scanning tool you use, you record features such as the network name (SSID-Services Set ID), MAC Address (BSSID- Basic Services Set ID), signal strength (shown in multiple formats- %, dBm, graphs etc.), Signal to Noise Ratio (only captured in Apple Computers), 802.11 version(s) supported, band (2.4 or 5 GHz) and channel(s) used.

Add the gathered data from the survey into the map of the covered area. On the map you indicate the location of the access points and the locations where you took measurements. For the access points, use the actual location if you know it, or an approximation based on the observed signal strength (e.g. if you don’t know exactly where it is).

[2] Take screenshots of survey data at each survey location, and include the screenshots of raw data in the Appendix of your report.

- 学号以“2”结尾的学生：学与教大楼
- 学号以“3”结尾的学生：Menzies Building
- 学号以“4”结尾的学生：David Derham Law Building
- 学号结尾为“5”的学生：学习村
- 学号以“6”结尾的学生：生物医学学习与教学（BLTB）

- 学号以“7”结尾的学生：数学和EAE
- 学号结尾为“8”的学生：校园中心
- 学号以“9”结尾的学生：Woodside Building

（您可以在这里找到大楼的位置 - 选择克莱顿校区）

对于马来西亚校园学生：
在我们的马来西亚校园内创建您自己选择的任何建筑物（的一部分）的地图和调查。

（您可以在这里找到大楼的位置 - 选择吉隆坡校区）

一个简单的平面图就足够了，不必完全按比例绘制。请参阅附录 A 的示例。您还可以使用莫纳什数字地图作为基础。地图上应标有所有相关信息（例如尺寸、门、墙壁以及木材、混凝土或玻璃等材料，如果用于讨论）。您的调查应覆盖至少 60 平方米的面积（例如 6x10 米、4x15 或两层楼，每层 6x5）。请务必考虑任务 1.2 中的分析，通过设计调查以包括墙壁、门等。在任务 1.2 中写出一些有趣的内容会更容易。

此外，您的调查必须至少包括三个 WiFi 接入点 (AP)。如果需要，您可以使用手机创建额外的 AP（使用“个人热点”或“网络共享”功能）。

对于调查，请在地图上至少八个不同的位置使用 WLAN 嗅探工具（见下文）。对于每个位置，记录所有可见 AP 的技术特征。根据您使用的扫描工具，您可以记录网络名称（SSID-服务集 ID）、MAC 地址（BSSID-基本服务集 ID）、信号强度（以多种格式显示 - %、dBm、图表等）等功能。 ）、信噪比（仅在 Apple 计算机中捕获）、支持的 802.11 版本、使用的频段（2.4 或 5 GHz）和通道。

将调查收集的数据添加到覆盖区域的地图中。您可以在地图上标明接入点的位置以及进行测量的位置。对于接入点，如果您知道，请使用实际位置，或者使用基于观察到的信号强度的近似位置（例如，如果您不确切知道它在哪里）。

2 对每个调查地点的调查数据进行屏幕截图，并将原始数据的屏幕截图包含在报告的附录中。

For each measurement point, you either add the characteristics directly into the map, or create a separate table with the details. You can submit several maps if you choose to enter data directly into the maps, or a single map if you use additional tables. Create the map yourself, do not use the mapping features available in some commercial (i.e., paid) WLAN sniffing tools.

Remark:

- We recommend you to go to your allocated building (for the purpose of doing this assignment) before 6pm on weekdays. Some buildings may have access control after 6pm or on weekends. Also, as per Monash policy, this unit (a year one unit) does not schedule any on-campus activities after 6pm. Therefore we do not recommend you to conduct any on-campus in-site activities after 6pm or on any weekends.
- Do not enter any area with access control (e.g. Woodside Building Room G13 Cybersecurity Lab). You do not need to enter those areas to conduct your assignment. You can choose other alternative locations inside or outside the building instead.
- In any circumstance, if there are some teaching activities or events inside any classroom, you should not enter the classroom to disturb the participants inside. You should wait until they have left the room, or find an alternative location for your analysis.
- Even if you cannot enter any classroom or any room inside the building, you can still take the WiFi measurement in the open area or outside the building. Please refer to Appendix B for an example.
- The Monash digital map does not contain any scale. You may use any other tools (e.g. any measurement app in your smartphone) or use Google Map (which contains measurement scale) to compare with the Monash digital map for dimension measurement.

Task 1.2: Report (16 marks)

Write a report (word limit 600) on your observations analysing the data collected in the previous step (Task 1.1). Your analysis should investigate the following aspects:

- Channel occupancy: Are different access points competing on the same channels? Are they configured to use overlapping channels? Could the configuration be improved?
  (4 marks)
- Attenuation from walls, doors etc.: How do different materials affect signal strength and/or noise? Can you notice a difference in attenuation for different APs?
  (4 marks)
- Coverage: Do the access points sufficiently cover the desired area? Could the placement or configuration be improved?
  (4 marks)
- Any other aspect of your own choice. Here are a few suggestions to pick one or more:
  - measure the attenuation caused by your own body
  - determine the overlap that has been implemented to enable roaming

对于每个测量点，您可以直接将特征添加到地图中，也可以创建一个包含详细信息的单独表格。如果您选择直接将数据输入到地图中，则可以提交多个地图；如果您使用其他表格，则可以提交单个地图。自己创建地图，不要使用某些商业（即付费）WLAN 嗅探工具中提供的地图功能。

评论：

- 我们建议您在工作日下午 6 点之前前往分配的大楼（为了完成此作业）。某些建筑物在下午 6 点后或周末可能会实施出入控制。此外，根据莫纳什大学政策，该单元（一年级单元）下午 6 点后不会安排任何校园活动。因此，我们不建议您在下午6点之后或任何周末进行任何校内活动。

- 请勿进入任何有访问控制的区域（例如 Woodside Building G13 网络安全实验室）。您无需进入这些区域即可执行任务。您可以选择建筑物内部或外部的其他替代位置。

- 在任何情况下，如果教室内有教学活动或事件，不得进入教室打扰里面的参加者。您应该等到他们离开房间，或者找到另一个位置进行分析。

- 即使您无法进入大楼内的任何教室或任何房间，您仍然可以在空旷区域或大楼外进行WiFi测量。请参阅附录 B 的示例。

- 莫纳什数字地图不包含任何比例尺。您可以使用任何其他工具（例如智能手机中的任何测量应用程序）或使用Google Map（包含测量比例）与Monash数字地图进行比较以进行尺寸测量。

任务 1.2：报告（16 分）

根据您的观察结果写一份报告（字数限制 600），分析上一步（任务 1.1）中收集的数据。您的分析应调查以下几个方面：

- 信道占用：不同的接入点是否在同一信道上竞争？它们是否配置为使用重叠通道？配置可以改进一下吗？

  （4分）
- 墙壁、门等的衰减：不同的材料如何影响信号强度和/或噪音？您能注意到不同 AP 的衰减差异吗？ （4分）

- 覆盖范围：接入点是否足以覆盖所需区域？布局或配置是否可以改进？ （4分）

- 其他的方面就看你自己的选择了。以下是一些可供选择一项或多项的建议： ○ 测量您自己的身体造成的衰减 ○ 确定已实施的重叠以启用漫游

- describe how you interpolated the locations of access points from the signal strengths
- measure how interference affects download speeds

Describe your findings and explain them with some technical detail (i.e., not only say what you found, but also how you performed the analysis or why you think the network is behaving that way).
(4 marks)

Tools: You can use e.g. Acrylic Wifi (https://www.acrylicwifi.com/en/) for Windows, NetSpot (http://www.netspotapp.com) for macOS and Windows, and LinSSID or wavemon for Linux. If you have an Android smartphone, apps like Wifi Analyzer can also be used. On iOS, WiFi scanning apps do not provide enough detail, so iPhones may not be suitable for this task.

For drawing the site maps, any drawing tool should work, for example LucidChart, or even presentation tools such as PowerPoint, Keynote or Google Slides. Scans of hand-drawn maps are **NOT** acceptable.

Submit your work for this part (Part 1b) as a PDF file (independent of Part 1a) in Moodle.

○ 描述您如何根据信号强度插值接入点的位置 ○ 测量干扰如何影响下载速度 描述您的发现并用一些技术细节进行解释（即，不仅说明您发现了什么，还说明您如何执行分析或原因）你认为网络就是这样运行的）。

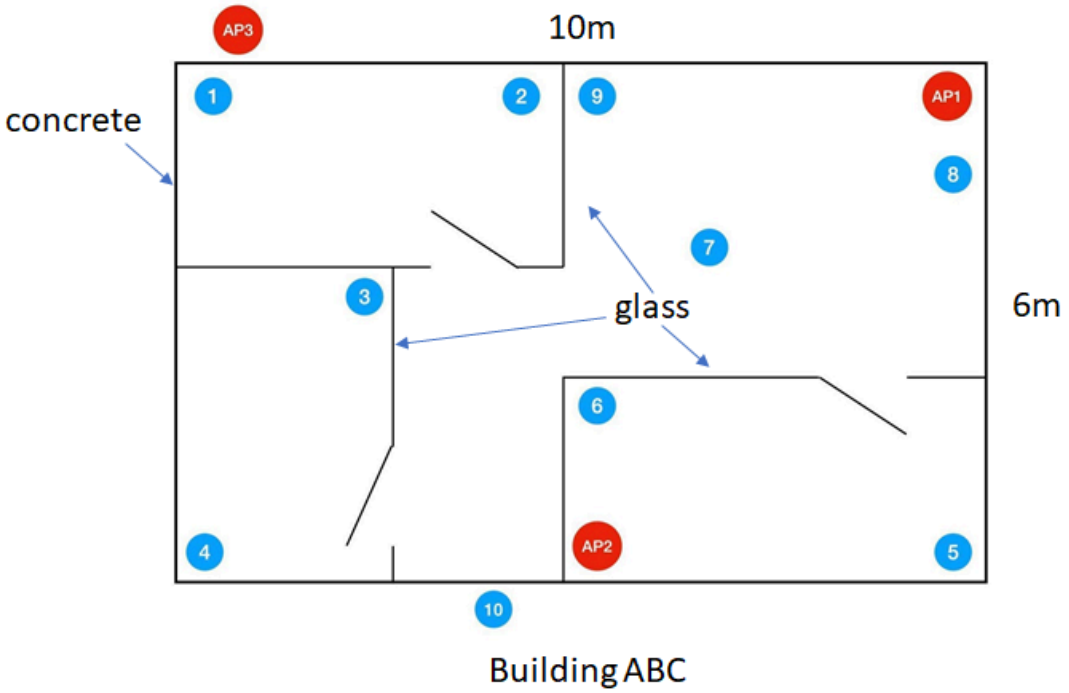
（4分）

工具：您可以使用例如适用于 Windows 的 Acrylic Wifi (https://www.acrylicwifi.com/en/)、适用于 macOS 和 Windows 的 NetSpot (http://www.netspotapp.com) 以及适用于 Linux 的 LinSSID 或 wavemon。如果您有 Android 智能手机，也可以使用 Wifi Analyzer 等应用程序。在 iOS 上，WiFi 扫描应用程序无法提供足够的详细信息，因此 iPhone 可能不适合执行此任务。

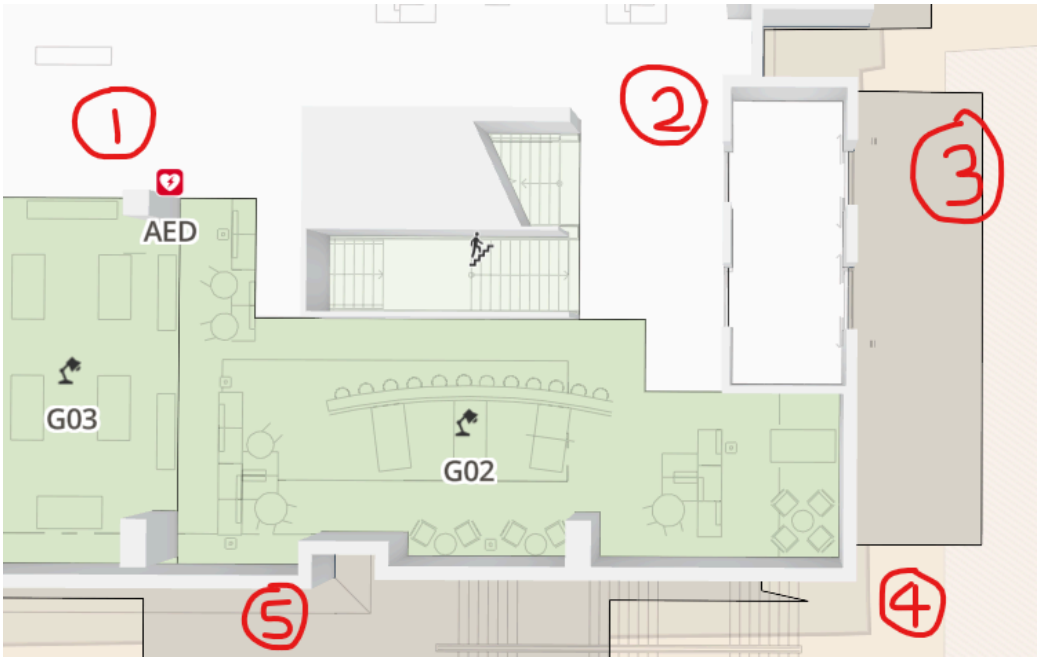
为了绘制站点地图，任何绘图工具都可以使用，例如 LucidChart，甚至是 PowerPoint、Keynote 或 Google Slides 等演示工具。不接受手绘地图的扫描件。

在 Moodle 中以 PDF 文件形式（独立于第 1a 部分）提交本部分（第 1b 部分）的作品。

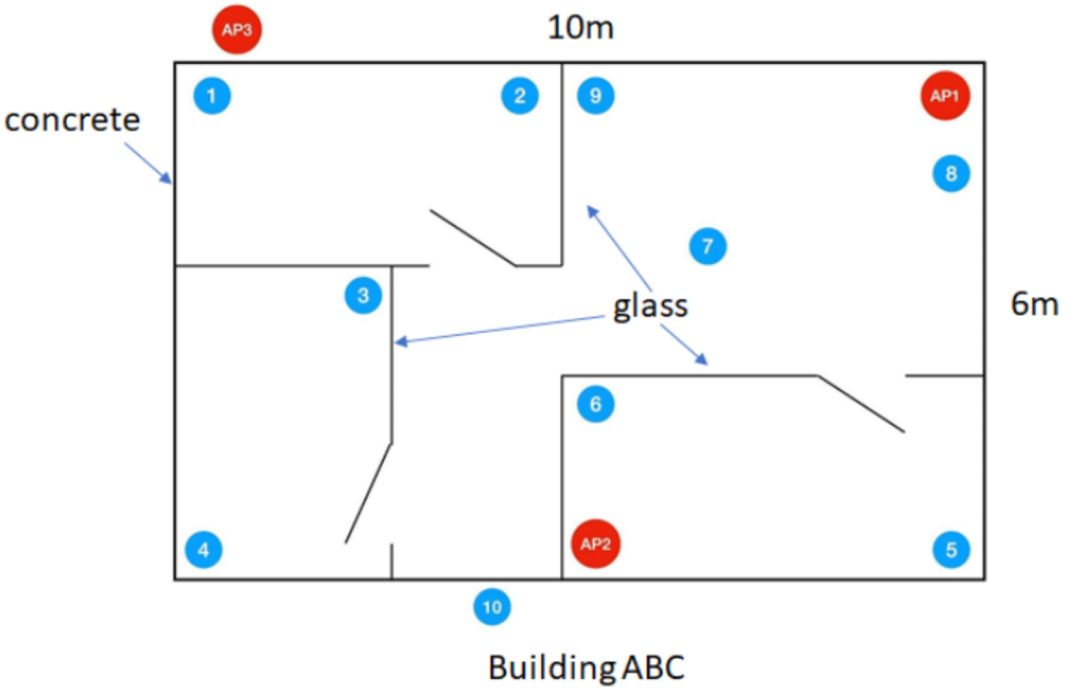
Appendix A: Sample map showing APs and survey location details



Appendix B: Even if you cannot enter a classroom (e.g. G02 and G03 below), you can still take the reading inside (e.g. 1, 2) and outside the building (e.g. 3, 4, 5) to conduct this assignment.



附录 A：显示受影响人和调查位置详细信息的示例地图



附录B：即使您无法进入教室（例如下面的G02和G03），您仍然可以在建筑物内（例如1、2）和建筑物外（例如3、4、5）进行阅读来完成此作业。