



**DONALD E. KIRK**

**OPTIMAL  
CONTROL  
THEORY  
AN INTRODUCTION**

# Optimal Control An Introduction

**Athans M.**



## **Optimal Control An Introduction:**

Recognizing the way ways to acquire this books **Optimal Control An Introduction** is additionally useful. You have remained in right site to start getting this info. get the Optimal Control An Introduction belong to that we allow here and check out the link.

You could buy lead Optimal Control An Introduction or acquire it as soon as feasible. You could quickly download this Optimal Control An Introduction after getting deal. So, as soon as you require the books swiftly, you can straight acquire it. Its therefore very simple and so fats, isnt it? You have to favor to in this aerate

[https://matrix.jamesarcher.co/book/virtual-library/Download\\_PDFS/complete%20workbook%20sight%20words%20learning.pdf](https://matrix.jamesarcher.co/book/virtual-library/Download_PDFS/complete%20workbook%20sight%20words%20learning.pdf)

## **Table of Contents Optimal Control An Introduction**

1. Understanding the eBook Optimal Control An Introduction
  - The Rise of Digital Reading Optimal Control An Introduction
  - Advantages of eBooks Over Traditional Books
2. Identifying Optimal Control An Introduction
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Optimal Control An Introduction
  - User-Friendly Interface
4. Exploring eBook Recommendations from Optimal Control An Introduction
  - Personalized Recommendations
  - Optimal Control An Introduction User Reviews and Ratings
  - Optimal Control An Introduction and Bestseller Lists

5. Accessing Optimal Control An Introduction Free and Paid eBooks
  - Optimal Control An Introduction Public Domain eBooks
  - Optimal Control An Introduction eBook Subscription Services
  - Optimal Control An Introduction Budget-Friendly Options
6. Navigating Optimal Control An Introduction eBook Formats
  - ePub, PDF, MOBI, and More
  - Optimal Control An Introduction Compatibility with Devices
  - Optimal Control An Introduction Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Optimal Control An Introduction
  - Highlighting and Note-Taking Optimal Control An Introduction
  - Interactive Elements Optimal Control An Introduction
8. Staying Engaged with Optimal Control An Introduction
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Optimal Control An Introduction
9. Balancing eBooks and Physical Books Optimal Control An Introduction
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Optimal Control An Introduction
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Optimal Control An Introduction
  - Setting Reading Goals Optimal Control An Introduction
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Optimal Control An Introduction
  - Fact-Checking eBook Content of Optimal Control An Introduction
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

### **Optimal Control An Introduction Introduction**

In today's digital age, the availability of Optimal Control An Introduction books and manuals for download has revolutionized the way we access information. Gone are the days of physically flipping through pages and carrying heavy textbooks or manuals. With just a few clicks, we can now access a wealth of knowledge from the comfort of our own homes or on the go. This article will explore the advantages of Optimal Control An Introduction books and manuals for download, along with some popular platforms that offer these resources. One of the significant advantages of Optimal Control An Introduction books and manuals for download is the cost-saving aspect. Traditional books and manuals can be costly, especially if you need to purchase several of them for educational or professional purposes. By accessing Optimal Control An Introduction versions, you eliminate the need to spend money on physical copies. This not only saves you money but also reduces the environmental impact associated with book production and transportation. Furthermore, Optimal Control An Introduction books and manuals for download are incredibly convenient. With just a computer or smartphone and an internet connection, you can access a vast library of resources on any subject imaginable. Whether you're a student looking for textbooks, a professional seeking industry-specific manuals, or someone interested in self-improvement, these digital resources provide an efficient and accessible means of acquiring knowledge. Moreover, PDF books and manuals offer a range of benefits compared to other digital formats. PDF files are designed to retain their formatting regardless of the device used to open them. This ensures that the content appears exactly as intended by the author, with no loss of formatting or missing graphics. Additionally, PDF files can be easily annotated, bookmarked, and searched for specific terms, making them highly practical for studying or referencing. When it comes to accessing Optimal Control An Introduction books and manuals, several platforms offer an extensive collection of resources. One such platform is Project Gutenberg, a nonprofit organization that provides over 60,000 free eBooks. These books are primarily in the public domain, meaning they can be freely distributed and downloaded. Project Gutenberg offers a wide range of classic literature, making it an excellent resource for literature enthusiasts. Another popular platform for Optimal Control An Introduction books and manuals is Open Library. Open Library is an initiative of the Internet Archive, a non-profit organization dedicated to digitizing cultural artifacts and making them accessible to the public. Open Library hosts millions of books, including both public domain works and contemporary titles. It also allows users to

borrow digital copies of certain books for a limited period, similar to a library lending system. Additionally, many universities and educational institutions have their own digital libraries that provide free access to PDF books and manuals. These libraries often offer academic texts, research papers, and technical manuals, making them invaluable resources for students and researchers. Some notable examples include MIT OpenCourseWare, which offers free access to course materials from the Massachusetts Institute of Technology, and the Digital Public Library of America, which provides a vast collection of digitized books and historical documents. In conclusion, Optimal Control An Introduction books and manuals for download have transformed the way we access information. They provide a cost-effective and convenient means of acquiring knowledge, offering the ability to access a vast library of resources at our fingertips. With platforms like Project Gutenberg, Open Library, and various digital libraries offered by educational institutions, we have access to an ever-expanding collection of books and manuals. Whether for educational, professional, or personal purposes, these digital resources serve as valuable tools for continuous learning and self-improvement. So why not take advantage of the vast world of Optimal Control An Introduction books and manuals for download and embark on your journey of knowledge?

### **FAQs About Optimal Control An Introduction Books**

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer web-based readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Optimal Control An Introduction is one of the best book in our library for free trial. We provide copy of Optimal Control An Introduction in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Optimal Control An Introduction. Where to download Optimal Control An Introduction online for free? Are you looking for Optimal Control An Introduction PDF? This is definitely going to save you time and cash in something you should think about.

**Find Optimal Control An Introduction :**

**complete workbook sight words learning**

[digital literacy manual reader's choice](#)

[blueprint picture book toddlers](#)

**fitness training manual ultimate guide**

[fitness training manual 2026 guide](#)

[trauma healing workbook hardcover](#)

[blueprint reading comprehension workbook](#)

[stories alphabet learning workbook](#)

[children bedtime story paperback](#)

[2025 edition personal finance literacy](#)

[2025 edition self help mindset](#)

[cozy mystery bookshop advanced strategies](#)

**cozy mystery bookshop training guide**

[friendship stories kids collection](#)

[rhyming story collection reader's choice](#)

**Optimal Control An Introduction :**

**monuments of macedonia 2020 wall calendar 2020 di r a** - May 02 2023

web you could buy guide monuments of macedonia 2020 wall calendar 2020 di or get it as soon as feasible you could quickly download this monuments of macedonia 2020

[monuments of macedonia 2020 wall calendar 2020 di](#) - Jul 04 2023

web monuments of macedonia 2020 wall calendar 2020 di is available in our digital library an online access to it is set as public so you can get it instantly our book servers saves in

**monuments of macedonia 2020 wall calendar 2020 di pdf full** - Apr 01 2023

web later some harmful virus inside their computer monuments of macedonia 2020 wall calendar 2020 di pdf is handy in our digital library an online entry to it is set as public

**monuments of macedonia 2020 wall calendar 2020 di** - Jun 22 2022

web monuments of macedonia 2020 wall calendar 2020 di history of architecture music and memory in the ancient greek and

roman worlds motion in classical literature

**monuments of macedonia 2020 wall calendar 2020 di robin j** - Dec 29 2022

web competently as sharpness of this monuments of macedonia 2020 wall calendar 2020 di can be taken as skillfully as picked to act the hellenistic reception of classical

**best historical landmarks in macedonia** - Jul 24 2022

web from skopje vodno mountain and matka canyon tour 379 reviews escape the hustle and bustle of skopje city center and get back to nature in the matka canyon ride the

**macedonia hd wallpapers wallpaper cave** - Jan 18 2022

web tons of awesome macedonia hd wallpapers to download for free you can also upload and share your favorite macedonia hd wallpapers hd wallpapers and background images

monuments of macedonia 2020 wall calendar 2020 di pdf copy - Sep 06 2023

web monuments of macedonia 2020 wall calendar 2020 di pdf as one of the most lively sellers here will unconditionally be in the course of the best options to review title

*monuments of macedonia 2020 wall calendar 2020 di* - Mar 20 2022

web monuments of macedonia 2020 wall calendar 2020 di downloaded from kretzlerstavern com by guest june kaufman general knowledge 2020

*monuments of macedonia 2020 wall calendar 2020 di abi* - Nov 27 2022

web monuments of macedonia 2020 wall calendar 2020 di is simple in our digital library an online right of entry to it is set as public as a result you can download it instantly

**monuments of macedonia 2020 wall calendar 2020 di anne** - Jan 30 2023

web install monuments of macedonia 2020 wall calendar 2020 di fittingly simple brill s companion to ancient macedon robin j fox 2011 06 22 drawing on the latest

*monuments of macedonia 2020 wall calendar 2020 di* - Oct 27 2022

web this monuments of macedonia 2020 wall calendar 2020 di as one of the most lively sellers here will extremely be among the best options to review holidays around the

monuments of macedonia 2020 wall calendar 2020 di pdf - Feb 28 2023

web monuments of macedonia 2020 wall calendar 2020 di macedonia archaeology civilisation conservation of the surface of the acropolis monuments civic and uncivic

*monuments of macedonia 2020 wall calendar 2020 di pdf* - Jun 03 2023

web 2020 2020 wall calendar 12 month jan dec perfect for organizing and planning city and skylines feb 02 2023 2020 wall

calendar 12 month jan dec perfect for

**monuments of macedonia 2020 wall calendar 2020 di pdf book** - Dec 17 2021

web jun 3 2023 we present monuments of macedonia 2020 wall calendar 2020 di pdf and numerous books collections from fictions to scientific research in any way among them

**monuments of macedonia 2020 wall calendar 2020 di pdf** - Apr 20 2022

web 2 monuments of macedonia 2020 wall calendar 2020 di 2021 10 21 of view of the artist the viewer and the work of art in doing so this study elaborates on the vital links

macedonia wallpapers wallpaper cave - Nov 15 2021

web tons of awesome macedonia wallpapers to download for free you can also upload and share your favorite macedonia wallpapers hd wallpapers and background images

**macedonia wall art etsy** - May 22 2022

web check out our macedonia wall art selection for the very best in unique or custom handmade pieces from our digital prints shops wall decoration pure bronze statue

**monuments of macedonia 2020 wall calendar 2020 di pdf** - Oct 07 2023

web mar 26 2023 we find the money for monuments of macedonia 2020 wall calendar 2020 di pdf and numerous book collections from fictions to scientific research in any

**monuments of macedonia 2020 wall calendar 2020 di pdf** - Aug 05 2023

web may 27 2023 monuments of macedonia 2020 wall calendar 2020 di pdf getting the books monuments of macedonia 2020 wall calendar 2020 di pdf now is not type of

most visited monuments in macedonia | famous monuments in - Aug 25 2022

web jan 3 2023 surrender yourself to the infectious energy of the locals coated in the beautiful tongue of the macedonian language as you embark on this journey here is one of the

**monumentsofmacedonia2020wallcalendar2020di** - Feb 16 2022

web 1 monumentsofmacedonia2020wallcalendar2020di yeah reviewing a ebook

monumentsofmacedonia2020wallcalendar2020di could add your near friends listings

**free monuments of macedonia 2020 wall calendar 2020 di** - Sep 25 2022

web monuments of macedonia 2020 wall calendar 2020 di philip and alexander aug 27 2022 this definitive biography of one of history s most influential father son duos tells the

**enthalpy for ammonia absorption cheresources com community** - Mar 19 2022

web apr 11 2007 my copy is the 1985 fundamentals and on figure 32 enthalpy concentration diagram for ammonia water

solution on page 17 68 you will find the enthalpy values you are seeking additionally you will find a complete typical absorption refrigeration example using aqua ammonia on page 1 24 example 6

*enthalpy concentration diagram for aqua ammonia* - Apr 19 2022

web enthalpy concentration diagram for aqua ammonia author aaron bodenstein from orientation sutd edu sg subject enthalpy concentration diagram for aqua ammonia keywords concentration enthalpy ammonia diagram for aqua created date [pdf development of thermo physical properties of aqua ammonia](#) - Feb 27 2023

web jan 1 2017 both the low temperature and medium temperature kalina cycle systems ltkcs and mtkcs have been modelled with ammonia water mixture properties calculated up to 100 bar pressure 14 the model

**enthalpy concentration ammonia water solutions chart** - Aug 24 2022

web aqua ammonia enthalpy concentration diagram the fifth column is the heat of vaporization needed to convert one gram of liquid to vapor freezing curve of ammonia water system three eutectic points i ii and iii are shown enthalpy concentration ammonia water solutions this tutorial describes how to read an aqua ammonia

**ammonia enthalpy concentration diagram pdf scribd** - May 21 2022

web development of thermo physical properties of aqua ammonia 127 figure 4 enthalpy concentration for a ammonia water mixture up to 100 bar see online version for colours

*enthalpy concentration diagram for ammonia water mixtures* - Mar 31 2023

web enthalpy concentration diagram for ammonia water mixtures free download as word doc doc pdf file pdf text file txt or read online for free diagrama de entalpia concentraion para mezclas de amoniaco agua

*4 34 4 35 temperature composition phase diagram for ammonia water* - Sep 05 2023

web 4 34 4 35 enthalpy concentration phase diagram for ammonia water mixtures at 300 psia 20 4 atm 400 300 200 100 0 100 200 300 400 500 600 700 800 900 1000 1100 1200 0 0 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 1 weight fraction ammonia enthalpy btu lb ice nh3 h2o ice soln nh3 2h2o solid nh3 vapor liquid solution 80 f 40 f 320 f 280 f

*ammonia data page wikipedia* - Jul 23 2022

web the s notation indicates equilibrium temperature of vapor over solid otherwise temperature is equilibrium of vapor over liquid log10 of anhydrous ammonia vapor pressure uses formula shown below vapor pressure formula for ammonia  $2 \log_{10} p = a - b/t + c$  where p is pressure in k pa and t is temperature in kelvins

*ammonia nh 3 thermodynamic properties the engineering toolbox* - May 01 2023

web online calculator figures and tables showing dynamic absolute and kinematic viscosity of gaseous and liquid ammonia at temperatures ranging from 73 to 425 c 100 to 800 f at pressure ranging from 1 to 1000 bara 14 5 14500 psia si and imperial units ammonia prandtl number vs temperature and pressure

**enthalpy concentration diagrams ammonia water big chemical encyclopedia** - Jul 03 2023

web the diagram shows the enthalpy of mixtures of ammonia and water versus concentration with pressure and temperature as parameters it covers the phase changes from solid to liquid to vapour and the enthalpy values given include the

[aqua ammonia enthalpy concentration diagram youtube](#) - Oct 06 2023

web this tutorial describes how to read an aqua ammonia enthalpy concentration diagram reading this diagram helps in designing an aqua ammonia vapor absorption

**diagrams of entropy for ammonia water mixtures applications to** - Nov 26 2022

web oct 1 2017 the studies were based on the enthalpy vs concentration diagram obtaining the enthalpy in the liquid phase corresponding at a temperature range from 80 c to 40 c the mixtures enthalpy values were calculated for ammonia h 1c and water h 2c by using a non linear regression program

**enthalpy concentration diagram of the ammonia water mixture** - Oct 26 2022

web download scientific diagram enthalpy concentration diagram of the ammonia water mixture source herold 1996 from publication design of a single acting ammonia water solar absorption cooling

**enthalpy concentration diagrams chemical** - Jan 29 2023

web jan 4 2014 enthalpy concentration diagrams the variation of enthalpy for binary mixtures is conveniently represented on a diagram an example is shown in figure 3 3 the diagram shows the enthalpy of mixtures of ammonia and water versus concentration with pressure and temperature as parameters it covers the phase

[ammonia solution wikipedia](#) - Jun 02 2023

web ammonia solutions decrease in density as the concentration of dissolved ammonia increases at 15.6 c 60.1 f the density of a saturated solution is 0.88 g/ml and contains 35.6 ammonia by mass 308 grams of ammonia per litre of solution and has a molarity of approximately 18 mol/l

[enthalpy concentration diagram for aqua ammonia download](#) - Feb 15 2022

web mollier h s diagram for water and steam aug 04 2022 this diagram is based on the newest industrial standard iapws if97 for the thermodynamic properties of water and steam which replaces the previous industrial formulation ifc 67 removal of heavy metals from mine drainage by precipitation aug 12 2020

**evaluation of thermodynamic properties of ammonia water** - Sep 24 2022

web the property chart that is enthalpy concentration entropy concentration temperature concentration and exergy concentration charts have been prepared the present work can be used to simulate the power generating systems to get the feasibility of the proposed ideas up to 100 bar

**enthalpy concentration for a ammonia water mixture up to 100** - Aug 04 2023

web download scientific diagram enthalpy concentration for a ammonia water mixture up to 100 bar see online version for colours from publication development of thermo physical properties of

**lesson aligarh muslim university** - Jun 21 2022

web discuss the properties of ammonia water mixtures and introduce pressure temperature concentration  $p$   $t$   $\xi$  and enthalpy temperature concentration  $h$   $t$   $\xi$  charts section 16 2

**figure 1 ammonia water enthalpy concentration diagram** - Dec 28 2022

web figure 1 shows the enthalpy concentration plot as function of ammonia concentration and pressure both the low temperature and medium temperature kalina cycle systems ltkcs and mtkcs have been

**5600sxt softener system vt 11 01 vt 17 01 vt 23 01 operation manual** - May 05 2023

web this installation manual is designed to guide the installer through the process of installing and starting the 5600 sxt softener this manual is a reference and will not include every system installation situation the person installing this equipment should have knowledge in the water softener installation basic plumbing skills

**5600se valve squarespace** - Mar 03 2023

web water softener operation manual read all instructions carefully before operation 51402 rev 7 06 performance and specifications caution these water conditioners are not intended to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system

[welcome to softenerparts com repair parts and how to guides](#) - Nov 30 2022

web welcome to softenerparts com repair parts and how to guides home 5600se 5600se your search for 5600se returned the following results products 30 5600 rebuild kit pistons and seals softener 79 00 add to cart 5600se sxt rebuild kit downflow 89 45 add to cart brine cam gear 5600 se sxt 18722 14 00 add to cart

*elite 5600se water softener* - May 25 2022

web 2 elite 5600se water softener 2022 09 05 ethnographies that stress the importance of treating the internet as both a site and product of cultural production accounts in media studies that highlight the continuities between old and new media and a range of works that have made critical interventions in the field of iranian

**elite 5600se water softener manual 2023 portal nivbook co** - Jun 25 2022

web 2 2 elite 5600se water softener manual 2022 05 21 electronic structure of materials cambridge university press this book is evolved from the experience of the author who taught all lab courses in his three decades of teaching in various universities in india

**elite 5600se water softener manual** - Mar 23 2022

web elite 5600se water softener manual manuals in pdf pdf solutions manuals pdf repair manuals ic manuals manuals

manuals manuals plus inc toshiba tv manuals 44 814 manuals and information flyers for a variety of sony brand monitors primarily professional grade garthus1 archivist filters 2 965 131

*elite 5600se water softener esource svb com* - Aug 28 2022

web elite 5600se water softener 3 3 electromechanical systems and devices springer science business media although we live in an era in which we are surrounded by an ever deepening fog of data few of us truly understand how the data are created where data are stored or how to retrieve or destroy data if that is indeed possible

fleck 5600se service manual pdf download manualslib - Jul 07 2023

web view and download fleck 5600se service manual online upflow brining 5600se water filtration systems pdf manual download

*model 5600se downflow v2 discount water softeners* - Apr 04 2023

web model 5600se downflow v2 0 master programming mode cont d 2 regeneration type 7 cont d meter delayed the control will determine that a regeneration is required when the available volume of softened water drops to or below zero regeneration is to begin immediately at the set regeneration time

**model 5600se aqua systems** - Aug 08 2023

web installed ahead of the water softener location of softener and drain the softener should be located close to a clean working drain and connected according to local plumbing codes by pass valves always provide for the installation of a by pass valve if unit is not equipped with one

**elite 5600se water softener manual dna viz tpq** - Feb 19 2022

web elite 5600se water softener manual 1 omb no 2810835902346 elite 5600se water softener manual electronic devices architectures for the nano cmos era electromechanical systems and devices electronic system level hw sw co design of heterogeneous multi processor embedded systems electromagnetic field computation

**fleck 5600se service manual pdf download manualslib** - Oct 10 2023

web view and download fleck 5600se service manual online downflow brining 5600se control unit pdf manual download

model 5600se downflow aqua systems - Jun 06 2023

web valve installation and start up procedures place the softener tank where you want to install the unit note be sure the tank is level and on a firm base during cold weather it is recommended that the installer warm the valve to room temperature before operating perform all plumbing according to local plumbing codes

**elite 5600se water softener manual** - Apr 23 2022

web elite 5600se water softener manual 70 934 items education 02 may nick b 05 jun 129 645 130k mar 23 2022 03 22 david c 26 jul contributed manuals awaiting sorting and integration priority service your manual is processed by our team in

priority order for a fee of 50 we will expedite the delivery of your instruction manual

[elite 5600se water softener esource svb com](#) - Jul 27 2022

web elite 5600se water softener downloaded from esource svb com by guest ayers hooper electronic tap changer for distribution transformers prentice hall modern electronic systems consist of a fairly heterogeneous set of components today a single system can be constituted by a hardware platform frequently composed of a mix of

**elite 5600se water softener manual pdf download pdf manual** - Oct 30 2022

web oct 2 2016 make your skin feel softer with this 420 elite series water softener the water softener prevents water hardness manual recommended setting the softener 5600se digital backwashing timer water fleck is the industry leader in control valves that power water softeners 5600se digital backwashing timer download service manual

[pentair 5600se service manual pdf download manualslib](#) - Sep 09 2023

web view and download pentair 5600se service manual online 5600se water dispenser pdf manual download

**fleck 5600sxt downflow manual pentair** - Jan 01 2023

web caution water pressure is not to exceed 125 psi 8 6 bar water temperature is not to exceed 110 f 43 c and the unit cannot be subjected to freezing conditions warning the system must be depressurized before removing any connections for servicing installation instructions 1 place the softener tank where you want to install the unit

*elite 5600se water softener manual medair* - Sep 28 2022

web elite 5600se water softener manual available in slate blue or natural silver the elite dragonfly g3 has a sleek chassis crafted from partly recycled magnesium and aluminum with what hp calls rounded pillow corners they make it

[5600se downflow v2](#) - Feb 02 2023

web proper softener operation requires the calculation of a brine tank refill time pounds of salt used per regeneration cycle 3 blfc size refill time in minutes example 10 lbs salt 3 0 25 gpm 13 3 minute refill consult valve service manual for actual step location use the set up and set down buttons to adjust this value 7