

ECE435: Network Engineering – Homework 3
encryption, e-mail

Due: Friday, 19 February 2021, 5:00pm

For this homework short answers will suffice.

To submit, create a document with your answers (text, pdf, libreoffice, MS Office if you must) and e-mail them to *vincent.weaver@maine.edu* by the homework deadline. Title your e-mail “ECE435 Homework 3” and be sure your name is included in the document.

1. Encryption

(a) **md5sum (2pts)**

- i. Download the file `hw3_test.txt` from the website:

`http://web.eece.maine.edu/~vweaver/classes/ece435/hw3_test.txt`
and calculate the md5sum.

On Linux you can run something like `md5sum test.txt`

If you aren't running Linux, you can try using a website for this,

`http://onlinemd5.com/` might work.

Report the md5sum that you get.

- ii. Make a copy of the file, and then make a small change (for example change the homework #). Re-run the md5sum. What's the resulting md5sum? How does the result compare to the unmodified file?

(b) **PGP/GPG (5 pts)**

On Linux use the `gpg` program for these tasks (if not installed, you can install it, something like `apt-get install gpg` or equivalent). You can also download GPG software for Windows/OSX from `https://gnupg.org/download/`.

- i. The file `hw3_test.txt.signed` is a file that has been PGP/GPG signed by me. Verify that it was actually me that signed it.

First download the signed file:

`http://web.eece.maine.edu/~vweaver/classes/ece435/hw3_test.txt.signed`

Then download my public key:

`http://web.eece.maine.edu/~vweaver/classes/ece435/weaver.public_key`

You will have to add this key to your keystore:

```
gpg --import weaver.public_key
```

Validate the `hw3_test.txt.signed` file:

```
gpg --verify ./hw3_test.txt.signed
```

Was it signed by me?

Now change something in the `hw3_test.txt.signed` file.

Reverify. Does it still pass?

- ii. You have unencrypted/unvalidated using the public key I linked to, but how can you know it was really *me* who signed things and not an imposter?
GPG probably complained about this.

Describe one technique used to authenticate that a public key belongs to who it says it does.

- iii. Encrypt a message using gpg and using my public key.
You can use the public key you imported earlier.
Create a text file `secret_message.txt` with your message.
Then run something like this:

```
gpg --output secret_message.gpg --encrypt \  
--recipient vincent.weaver@maine.edu secret_message.txt
```

Attach this `secret_message.gpg` when submitting your assignment.

2. E-mail Headers (3pts)

- (a) You receive an e-mail claiming to be from a bank. You turn extended e-mail headers on and below is what you see.

```
Return-Path: <starwood@dental.ufl.edu>  
Delivered-To: vince@deater.net  
Received: from pop.deater.net [64.26.60.216]  
    by pianoman.cluster.toy with POP3 (fetchmail-6.3.26)  
    for <vince@localhost> (single-drop); Wed,  
    16 Nov 2016 21:48:21 -0500 (EST)  
Received: from stor32.mfg.siteprotect.com ([192.168.31.39])  
    by stor15.mfg.siteprotect.com (Dovecot) with LMTP id  
    uahOABj4LFjrQQA9Krtqg  
    for <vince@deater.net>; Wed, 16 Nov 2016 18:21:44 -0600  
Received: from mx.siteprotect.com (unknown [192.168.33.227])  
    by stor32.mfg.siteprotect.com (Postfix) with ESMTMP id 8C23A1001FED  
    for <vince@deater.net>; Wed, 16 Nov 2016 18:21:38 -0600 (CST)  
Received: from smtp.ufl.edu (smtp-prod06.osg.ufl.edu [128.227.74.254])  
    (using TLSv1.2 with cipher ECDHE-RSA-AES256-GCM-SHA384 (256/256 bits))  
    (No client certificate requested)  
    by mx.siteprotect.com (Postfix) with ESMTPS id 3905955C087  
    for <vince@deater.net>; Wed, 16 Nov 2016 18:21:38 -0600 (CST)  
X-UFL-GatorLink-Authenticated: authenticated as starwood () with LOGIN  
    from 69.70.91.146  
Received: from localhost (modemcable146.91-70-69.static.videotron.ca  
    [69.70.91.146])  
    (authenticated bits=0)  
    by smtp.ufl.edu (8.14.4/8.14.4/3.0.0) with ESMTMP id uAH0K1dd032514  
    (version=TLSv1/SSLv3 cipher=DHE-RSA-AES256-GCM-SHA384 bits=256  
    verify=NOT);  
    Wed, 16 Nov 2016 19:20:20 -0500  
Message-ID: <0603B5E6ED391784585D14AA1EA70F57@dental.ufl.edu>  
From: "Maybank2u.com" <starwood@dental.ufl.edu>  
Subject: Transaction alert  
Date: Wed, 16 Nov 2016 19:20:18 -0500  
MIME-Version: 1.0  
Content-Type: multipart/mixed; boundary="0c69c634b31bc1d0b1050909ca80"  
X-Proofpoint-Virus-Version: vendor=fsecure engine=2.50.10432:,,
```

```

definitions=2016-11-16_07:,,
signatures=0
X-Proofpoint-Spam-Details: rule=notspam policy=default score=1 spamscore=1
suspectscore=10
malwarescore=0 phishscore=0 adultscore=0 bulkscore=0 classifier=spam
adjust=0 reason=mlx scancount=1 engine=8.0.1-1609300000
definitions=main-1611170005
X-Spam-Level: *
X-UFL-Spam-Level: *
X-CTCH-RefID: str=0001.0A020205.582CF817.018C,ss=3,re=0.000,recu=0.000,
reip=0.000,vtr=str,vl=0,cl=3,cld=1,fgs=0
X-Mail-Filter-Gateway-ID: 8C23A1001FED.A1639
Mail-Filter-Gateway: Scanned OK
X-Mail-Filter-Gateway-SpamDetectionEngine: NOT SPAM,
MailFilterGateway Engine (score=2.318, required 3,
autolearn=disabled, CTASD_SPAM_BULK 4.00, MISSING_HEADERS 1.21,
RP_MATCHES_RCVD -2.90, T_OBFU_PDF_ATTACH 0.01)
X-Mail-Filter-Gateway-SpamScore: **
X-Mail-Filter-Gateway-From: starwood@dental.ufl.edu
X-Mail-Filter-Gateway-To: vince@deater.net
X-Spam-Status: No
Parts/Attachments:
  1 Shown      ~9 lines  Text (charset: windows-1251)
  2           156 KB   Application
-----

```

An incoming transaction to your account was declined.

- i. Is this likely a legitimate e-mail? Why or why not?
- ii. The e-mail had a .pdf file attached. Should you open it? Why or why not?

(b) You look at a raw e-mail you received and it contains the following:

```

Content-Type: image/jpeg;
  name="26993963_n.jpg"
Content-Description: 26993963_n.jpg
Content-Disposition: attachment;
  filename="26993963_n.jpg"; size=228405;
  creation-date="Tue, 23 Jan 2018 16:48:41 GMT";
  modification-date="Tue, 23 Jan 2018 16:48:41 GMT"
Content-Transfer-Encoding: base64

/9j/4AAQSkZJRgABAgAAAQABAAD/7QCcUGhvdG9zaG9wIDMuMAA4QklNBAQAAAAAAAIAcAmcAFHpZ
ejRabS1UVmw2ejBfS3FMYnBhHAIoAGJGQk1EMDEwMDBhOWUwZDAwMDBjNjMzMDAwMGFkOGEwMDAw
Njk4ZjAwMDA5MDk3MDAwMGJkMjMwMTAwZTZmMjAxMDAwOGZiMDEwMDhhMDQwMjAwOTYxMjAyMDAz
NTdjMDMwMwP/iC/hJQ0NfUFJPRklMRQABAQAAACgAAAAAAgAAAG1udHJSR0IgwFlaIAfZAAMAGwAV
ACQAH2Fjc3AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAD21gABAAAAANMtAAAAACn4Pd6v
...
KMzUXkeXneFRVnYmq9ns4x7FBiYHdp+GWSOgsUpXZ1iEWuh5H/WC5AFE+j5Zx5yvPTW6NmPZWcsP
7e/jP//Z

```

- i. What is this section of the e-mail all about?
- ii. Why is there a large random jumble of letters at the end?