1) Beginning with year 1, I deposit \$1,000 a year at the end of the year into an account that is earning 3% interest compounded annually. Beginning in year 11, I increase my end of the year deposits to \$1,500. How much do I have immediately after my 20th deposit? *5 pts*

$$1000\left(\frac{(1+.03)^{10}-1}{.03}\right)\left(1.03\right)^{10} + 1500\left(\frac{(1+.03)^{9}-1}{.03}\right) =$$

$$= 11463.87931\left(1.03^{10}\right) + 17195.81897$$

$$= 32,602.31414$$

$$\boxed{\# \ 32,602.31}$$

2) I wish to buy a \$400,000 house. How many months will it take to pay off the house, given that I take out a loan at 7% interest, compounded monthly, and that I can afford to pay \$8,000 each month? *5 pts*

$$400{,}000\left(1+.07/12\right)^{12\cdot n} = 8{,}000\left(\frac{\left(1+.07/12\right)^{12\cdot n}-1}{.07/12}\right)$$

$$\div 8000$$

$$50\left(1+.07/12\right)^{12n} = \left(\frac{\left(1+.07/12\right)^{12n}-1}{.07/12}\right)$$

$$\times .07/12 \qquad \times .07/12$$

$$.2916\left(1+.07/12\right)^{12n} = \left(1+.07/12\right)^{12n}-1$$

$$\div\left(1+.07/12\right)^{12n} \qquad \div\left(1+.07/12\right)^{12n}$$

$$.2916 = 1 - \frac{1}{\left(1+.07/12\right)^{12n}}$$

$$-1 \qquad\qquad -1$$

$$-.7083 = -\frac{1}{\left(1+.07/12\right)^{12n}}$$

$$\ln\left|.7083\right| = \ln\left|\left(1+.07/12\right)^{-12n}\right|$$

$$\ln\left(.7083\right) = -12n\,\ln\left(1+.07/12\right)$$

$$\div\ln\left(1+.07/12\right) \qquad \div\ln\left(1+.07/12\right)$$

$$\div 59.28776504 = \div 12n$$

$$4.940647087 = n = years$$

$$12n = 59.28776504 \text{ months} \approx 60 \text{ months}$$

3) For the house in problem 2, how much do I owe after two years—i.e. after the 24th payment? *3 pt*

$$400,000 \left(1 + .07/12\right)^{24} - 8000 \left(\frac{\left(1 + .07/12\right)^{24} - 1}{.07/12}\right) = owe$$

$$459922.407 - 205448.2826 =$$

$$= 254,474.1644$$

you owe $254,474.15

4) I win a contest that pays $100,000 immediately. Each year it pays 10% more so, for example, my second payment is $110,000 and my third is $121,000. Assuming that I get a total of 20 payments, what is the present value of this award at the time of my first payment at 4% interest? *5 pt*

$$100,000(1.04)^{19} + 100,000(1.04)^{19}(1.10) + 100,000(1.04)^{18}(1.10)^2 \dots$$

$$FV \quad = 100,000(1.04)^{19}\left(1 + \frac{1.10}{1.04} + \left(\frac{1.10}{1.04}\right)^2 + \left(\frac{1.10}{1.04}\right)^3 \dots\right)$$

$$x = \frac{1.10}{1.04}$$

$$FV = 100,000(1.04)^{19}\left(1 + x + x^2 + x^3 \dots x^{19}\right)$$

$$FV = 100,000(1.04)^{19}\left(\frac{x^{20}-1}{x-1}\right)(1+x^2)$$

$$FV = 7,560,628.01$$

$$PV = (FV)(1.04)^{-19}$$

$$PV = 3,588,594.806$$

Present Value is $3,588,594.81

5) Answer the following questions concerning underwriting: *9 pt*

a. What is underwriting?

Underwriting is when degrees of risk on insurance applications are identified and classified into different categories.

b. Who does it?

Underwriters do the underwriting. Also insurance companies hire underwriters to look at applicants.

c. What are the four risk categories?

preferred category

standard category

substandard category

declined category

d. What is adverse selection? Give an example of it.

Adverse selection is when those that feel they have a greater than average risk to seek insurance coverage to a greater extent than do those with a less-than-average or average risk.

A severely overweight person with diabetes will be more likely to see medical insurance than a young athlete.

e. What is moral hazard? Give an example of it.

A moral hazard is one that increases the chance of a peril to occur due to the behavior of people / people's actions.

An example would be irresponsibility.

An individual presents a moral hazard if he / she is likely to deal dishonestly with the insurance company

6) Answer the following questions: *4 pts*
   a. What is the doctrine of proximate cause?

It states that the covered peril ~~is~~ the ***must be*** proximate cause of a covered consequences.

This is necessary for the damage to be covered

   b. Give an example of it in the context of homeowner's insurance.

~~For example, your there is heavy~~

~~For example, there is heavy rain. a~~

For example, there is lightning. The lightning strikes the house. As a result of that, the computer is spoilt. So, lightning is the covered peril. Coverage C under homeowner's insurances provides protection for contents in the house. For this case, the spoilage of my computer is the covered ~~st~~ consequence as a result of lightning strike, the covered peril.

7) A home owner' policy generally consists of two major sections, the first labeled A-D and a second part. What is covered under: *10 pts*

    a. Section II

        Liability coverage

    b. Part D

      extra expenses needed during repair of home.

    c. Part C

      personal items in your home

    d. Part B

      Outbuildings (garage, shed, etc.)

    e. Part A

      Home

8) Answer the following questions concerning the insurable interest requirement in insurance: *8 pt*

    a. What is the "insurable interest requirement" and why does it exist?

The insurable interest requirement states that an insurance policy can only be bought for another person when the loss of that person will cause an economic, emotional, or other loss/you will not gain from their death. It exists so that people do not profit from insurance policies.

    b. Who requires it?

The insurance company also requires it.

The government requires a policy owner to have an insurable interest in the insured. −1

    c. In which members of an individual's family would he/she automatically be presumed to have an insurable interest?

Mother, father, siblings, children, grandparents, spouse, *grand children*

    d. Give two examples of other circumstances under which an insurable interest might exist.

(1) A company would have an insurable interest in a key engineer coordinating much of their production.

(2) A racecar owner may have an insurable interest on the driver of his car.

9) Answer the following questions relating to Workman's Compensation: *8 pt*

   a. What kind of insurance company sells workman's compensation policies?

   Property and Casualty

   b. What was the doctrine of contributory negligence?

   If a co-worker causes the injury then the injured may not be able to recieve compensation for injuries.

   c. What was the doctrine-of-assumed risk?

   If the injured worker knew the dangers previous to the injury, then he would not be able to recieve compensation for injuries.

   d. How do the doctrines in b and c relate to current laws on workman's compensation?

   The doctrines in b and c are no longer involved in current laws regarding workman's compensation.

   e. Under current law, how does one determine who is at fault in a work related accident?

   Under current law, a work related accident is a no-fault situation.

10) Discuss insurance companies as business organizations. Answer the following questions: *9 pt*

a. What are the three ways a business might be organized? Of these three which must an insurance company be?

- Sole-proprietorship
- partnership
- corporation

An insurance company must be a corporation.

b. Distinguish between mutual companies and stock companies.

Mutual companies are owned by their policy holders.

Stock companies are owned by shareholders who buy stock in their company.

c. Give an advantage of being a mutual company.

A mutual company cannot be bought by another company.

d. Give two advantages of being a stock company.

A stock company can buy other companies and it can raise capital quickly through selling stocks.

e. Most insurance companies started as which form? Why?

Most insurance began as stock companies because it is easy to raise capital and they were not able to have a large number of policies right away.

11) The current value of my house is $200,000. I had a fire that caused $21,000 in damages for which I paid $6,000 with the insurance company picking up the rest. My home owner's policy has a $1,000 deductible on fire damage and a 75% co-insurance requirement. How much did I have my house insured for? *5 pts*

$$\frac{X}{200\,000\,(0.75)}\,(21000 - 1000) = 21000 - 6000$$

$$X = \$12\,500 \quad \#$$

12) Joe has a $150,000 fully insured house with a linearly disappearing deductible. For losses of $1,000 or less, the deductible is $500 while for losses of X or more there is no deductible. Find X given that Joe paid Joe paid $375 for a loss of $2,000.

5 pts
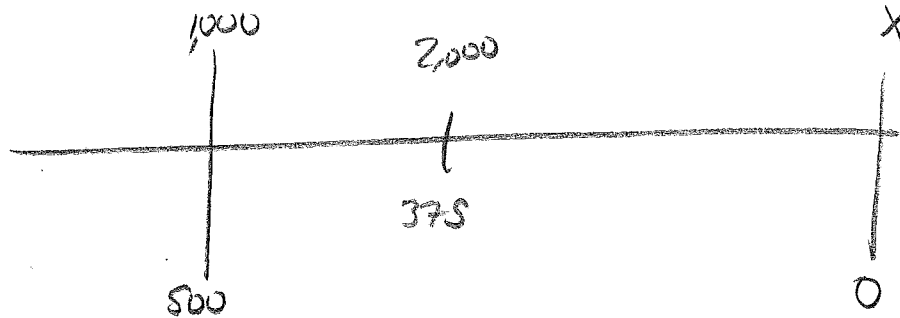
$$\frac{X-2000}{X-1000}(500) = 375$$

$$\frac{X-2000}{X-1000} = .75$$

$$X - 2000 = .75x - 750$$

$$.25x = 1250$$

$$\boxed{X = 5,000}$$

13) Ed and Mary live in a no-fault state. While driving in a snow storm Ed runs into Mary's car. It was clearly Ed's fault. Mary and Ed are both fully insured. *8 pts*

    a. Mary has to be taken to the hospital and treated for her injuries. Which coverage of pays for Mary's hospital costs?

Mary's Personal Injury Protection

    b. Mary is not satisfied with the amount she will get paid in part/a. Under what circumstances could she sue Ed?

threshold   no-fault state

i.e. Mary's injuries were above a certain threshold established by the state.

    c. Assuming that Ed has Liability Coverage, what role, if any, would Ed's insurance company play in the law suit in part b? To what extent? (Be specific.)

They would provide him with a lawyer and cover costs up to a certain limit. At that limit, they are not required to continue defending him.

The limit is the "policy limit."

    d. Which coverage pays for the damage to Mary's car?

Mary's collision coverage

Note There is no difference between fault and no-fault with regard to property damage

15) Below you are given a table of losses evaluated at 1/1/2010 for Klunker Auto Insurance. Assume all losses are fully developed at 48 months. Fill in the corresponding paid loss development factors in the second table. Give an answer accurate to at least two digits after the decimal. *5 pts*

Loss Reserves

Accident Year	Cumulative Paid Losses Development Stage in Months			
	12	24	36	48
2006	2,500	3,325	4,156	4,780
2007	3,000	3,600	4,644	
2008	2,000	2,660		
2009	1,000			

Development Stage in Months
Paid Loss Development Factors

Accident Year	Cumulative Paid Losses Development Stage in Months			
		12-24	24-36	36-48
2006		1.33	1.25	1.15
2007		1.2	1.29	
2008		1.33		
2009				

16) Based on the data in problem 15, Klunker's actuaries decided to use the loss development factors given below. What would their estimated reserves be for each of 2006, 2007, 2008, and 2009? *3 pt*

Selected Loss Development Factors

12-24	24-36	36-48	48-Ult.
1.25	1.28	1.2	1

1.92   1.536   1.2

2006 $0.00

2007 $928.80

2008 $1,425.76

2009 $920.00