1) Upon graduation Sarah has $40,000 in student loans at 7.5% interest, compounded monthly. How much does she still owe immediately after her 120th payment if she pays $270 at the beginning of each month? *(7 pts.)*

$$40000\left(1 + \frac{.075}{12}\right)^{120} = 84482.5855 = \text{Current Total}$$

$$270\left(\frac{\left(1 + \frac{.075}{12}\right)^{120} - 1}{\frac{.075}{12}}\right)\left(1 + \frac{.075}{12}\right) = 48341.4498 = \text{Paid}$$

$$CT - P = \boxed{\$36,141.14}$$

2) Beginning in year 2000, I began depositing $1000 per year at the _end_ of each year into a retirement account that was earning 4.2% per year. (My first deposit was made on December 31, 2000.) In 2010 the interest rate dropped to 2%. What will be my balance after my deposit on December 31, 2015? *(7 pts.)*

$$1000 \left(\frac{(1+.042)^{10} - 1}{.042} \right) =$$

$$1000 (12.1180\text{S}074) = 12118.05074$$

$$12118.05074 (1.02)^5 + 1000 \left(\frac{(1.02)^5 - 1}{.02} \right) =$$

$$13379.30719 + 1000 (5.20404016)$$

$$13379.30719 + 5204.04016 = \$18583.34735$$

$$\downarrow$$

$$\$18583.35$$

3) I own a 30 year bond that pays $200 coupons four times a year and has a $5,000 redemption value. I sell it immediately after collecting the 40th coupon to an investor wanting a 4.3% yield, compounded quarterly. What price should I charge? *(7 pts.)*

$$200\left(\frac{\left(1+\frac{.043}{4}\right)^{80}-1}{\frac{.043}{4}}\right) + 5000 = \$30159.80457$$

$$(30159.80457)\left(1+\frac{.043}{4}\right)^{-80} = \boxed{\$12,821.20}$$

4) Define

a. Endowment insurance (*3 pts.*)

An endowment insurance policy has a benefit amount that is paid either when the insured dies or on a specified date if the insured is still living.

b. Mutual insurance company. (*3 pts.*)

A mutual insurance company is owned by its policyholders. Periodically the policyholders receive a portion of the company's profits, called policy dividends.

c. Morbidity table (*3 pts.*)

A morbidity table shows the incidence rate by age of illness and accidental injury.

d. Cede (in the context of insurance) *(3pts.)*

An insurance company will cede a portion of a policy to a reinsurer to decrease the risk to them associated with the policy.

e. Moral hazard *(3pts.)*

Moral hazard is the likelihood that someone will be dishonest in an insurance transaction. For example, a convicted criminal would have a high moral hazard.

5) Jones Software Company wanted to buy an insurance policy on an artist who does contract work for them. Their request was originally denied by Penney Insurance on the basis of the Insurable Interest Requirement. Jones appealed and was eventually allowed to buy the insurance. Explain. Specifically, what is the Insurable Interest Requirement? Why might Penney Insurance have initially refused to sell the insurance? On what basis might Jones have appealed? *(6 pts.)*

The Insurable Interest Requirement is that to buy an insurance policy on someone, you must clearly benefit from that person staying alive. They may have initially refused to sell the policy because Jones is not related to the artist, so they do not satisfy the two-generation rule. Jones probably appealed on the basis that the artist is valuable to their company and Jones would lose money should something they lose the artist.

6) I work in a steel foundry. While at work I was run over by a truck, resulting in my being permanently crippled.

a. Name three benefits that I can expect to receive from Work Man's Compensation. *(3pts.)*

You can expect to receive medical payments benefits, lost wages benefits, and rehabilitation benefits.

b. The insurance company refuses to pay, pointing out that when I took the job, I signed a waiver stating that I was aware of the dangers of the work and would not hold the foundry responsible for any on the job accidents. They also said that the accident was the fault of the driver of the truck. I sue (them). Should I win? Explain in terms of current law. *(5pts.)*

insurance company

You should win. Under current law, workman's compensation is a no-fault system. Previously, the company could refuse to pay under the assumption-of-risk doctrine, since you signed the waiver, and the fellow-servant doctrine, since the truck driver was at fault; However, neither of those apply anymore.

7) While Richard was stopped for a stop light, John hit Richard's car from behind. It is John's fault. Both Richard and John are fully insured. ***Assume the coverage is in a no-fault state.***

a) What coverage in whose insurance policy would pay for the damages to Richard's car? *(3 pts.)*

‑ John's liability coverage ✓

b) What coverage in whose insurance policy would pay for the damages to John's car?*(3pts.)*

John's collision coverage ✓

c) Richard was injured in the accident. What coverage in whose insurance policy would pay for Richard's medical expenses?*(3pts.)*

Richard's personal injury protection

d) John's son who was riding with John was also injured. What coverage in whose insurance policy would pay for the son's medical expenses?*(3pts.)*

John's personal injury protection

8) Suppose that the accident described in problem 7) had occurred in a **tort state.** Which of the answers to parts a)-d) would change? How would they change? *(4pts.)*

The answer to part c) would change to "John's liability insurance would pay for Richard's medical expenses."

The answer to part d) would change to "John's medical payments would pay for the son's medical expenses."

9) A home owner' policy generally consists of two major parts, Section I and Section II. Section I is subdivided into parts labeled A-D. I had a disaster in my home. For each of the following losses explain which part, if any, would pay for the loss.

a. My tool shed, which is not attached to my house, was destroyed by a fire. *(3pts.)*

Section I, Part B (Out buildings) would pay for the loss.

b. The fire spread to the house, damaging the south wall. *(3pts.)*

Section I, Part A (House) would pay for the loss

c. The fire destroyed my new TV. *(3pts.)*

Section I, Part C (Property) would cover this loss.

d. The fire spread to my neighbor's house, causing considerable damage. *(3pts.)*

Section II (Liability) would cover this loss.

e. The fire was caused by faulty wiring in my air conditioner that was manufactured by Blow Hard Air. This caused a subrogation law suit. Who is suing whom? If the suit is successful what, if anything, might I gain from the suit? *(4pts.)*

The insurance company is suing Blow Hard Air. You have nothing to gain if the suit is successful. You could get your dedactible back. −0

10) My house is currently worth $300,000. I had a $50,000 loss for which the insurance company paid $40,000. There was no deductible, but the insurance company has a 75% co-insurance requirement. How much did I have the house insured for? *(5 pts.)*

$$300000 (.75) = 225000$$

$$\frac{X}{225000} = \frac{40000}{50000} = \frac{4}{5}$$

$$x = \boxed{\$180,000}$$

11) I have a $200,000 fully insured house with a linearly disappearing deductible. For losses of $2,000 or less, I pay everything while for losses of $5,000 or more I pay nothing. How much would the insurance pay on a loss of $3,000? *(5 pts.)*

$$\frac{3000 - 2000}{5000 - 2000} = \frac{1000}{3000} = \frac{1}{3} \rightarrow \text{you pay } \frac{2}{3} \text{ of}$$

$$2000 -$$

$$= \$1333.33$$

$$3000 - 1333.33 = \boxed{\$1666.67}$$

12) Below you are given a table of losses evaluated at 1/1/2014 for No Go
Auto Insurance. Assume all losses are fully developed at 48 months.
Fill in the corresponding paid loss development factors in the second
table. Give answer accurate to at least two digits after the decimal. *(4
pts.)*

Loss Reserves

Accident Year	Cumulative Paid Losses Development Stage in Months			
	12	24	36	48
2011	2,200	3,080	3,696	4,805
2012	1,000	1,200	1,800	
2013	3,000	3,900		
2014	2,000			

Development Stage in Months
Paid Loss Development Factors

Accident Year	Cumulative Paid Losses Development Stage in Months			
		12-24	24-36	36-48
2011		1.40	1.20	1.30
2012		1.20	1.50	
2013		1.30		
2014				

13) Based on the data in the preceding problem, No Go's actuaries decided to use the loss development factors given below. What would their estimated reserves be for each of 2011, 2012, 2013, and 2014? *(4 pts.)*

Selected Loss Development Factors

12-24	24-36	36-48	48-Ult.
1.3	1.2	1.3	1

2011 Reserve = _____ $0 _____ $= 4805\,(1) - 4805$

2012 Reserve = _____ $540 _____ $= 1800\,(1.3) - 1800$

2013 Reserve = _____ $2184 _____ $= 3900\,(1.3)(1.2) - 3900$

2014 Reserve = _____ $2056 _____ $= 2000\,(1.3)(1.2)(1.3) - 2000$