Dept of Mathematics and Statistics
King Fahd University of Petroleum & Minerals

AS483: Actuarial Risk Theory & Credibility
Dr. Mohammad H. Omar
Major 1 Exam Term 142 FORM A
Tuesday March 3 2015
6.00pm-7.30pm

Name_____ ID#:_____ Serial #:___

Instructions.

1. Please turn off your cell phones and place them under your chair. Any student caught with mobile phones on during the exam will be considered under the **cheating rules** of the University.
2. If you need to leave the room, please do so quietly so not to disturb others taking the test. No two person can leave the room at the same time. No extra time will be provided for the time missed outside the classroom.
3. Only materials provided by the instructor can be present on the table during the exam.
4. Do not spend too much time on any one question. If a question seems too difficult, leave it and go on.
5. Use the blank portions of each page for your work. Extra blank pages can be provided if necessary. If you use an extra page, indicate clearly what problem you are working on.
6. Only answers supported by work will be considered. Unsupported guesses will not be graded.
7. While every attempt is made to avoid defective questions, sometimes they do occur. In the rare event that you believe a question is defective, the instructor cannot give you any guidance beyond these instructions.
8. Mobile calculators, I-pad, or communicable devices are disallowed. Use regular scientific calculators or financail calculators only. Write important steps to arrive at the solution of the following problems.

The test is 90 minutes, GOOD LUCK, and you may begin now!

Question	Total Marks	Marks Obtained	Comments
1	4+5=9		
2	6		
3	2+2=4		
4	4		
5	12		
6	4+1=5		
Total	40		

Extra blank page

1. (4+5=9 points) for the Weilbull (50,1/3) distribution, obtain the following risk measures:
   a) VaR at the 99.9% security level
   b) TVaR at the 99.9% security level.

2. (6 points) Sixty-five percent of claims have a normal distribution with mean of 3000 and a variance of 1 000 000. The remaining 35% have a normal distribution with mean of 4000 and a variance of 1 000 000. Determine the **probability** that a randomly selected claims **exceeds** 5000.

3. (2+2=4 points) Losses in 1993 follow the density function $f(x) = 3x^{-4}, \ x \geq 1$, where x is the loss in millions of dollars. Inflation of 5% impacts all claims uniformly from 1993 to 1994.

   a) Determine the cumulative distribution function (**cdf**) of losses for 1994 and

   b) Use the cdf in (a) to determine the **probability** that a 1994 loss **exceeds** 2.2 million dollars.

4. (4+4+4=12 points) Consider a negative binomial random variable with parameters $\beta = 1.5$ and $r = 2.5$.

   a) Determine the **first four probabilities** (p_0 to p_3) for this random variable.

   b) Determine the corresponding probabilities for the **zero-truncated** version and

   c) Determine the corresponding probabilities for the **zero-modified** (with $p_0^M = 0.6$) version.

5. (4 points) Determine the **limiting distribution** of the generalized Pareto distribution (with pdf given below) as α and θ both tend to infinity.

$$f_X(x) = \frac{\Gamma(\alpha+\tau)}{\Gamma(\alpha)\Gamma(\tau)} \frac{\theta^\alpha x^{\tau-1}}{(x+\theta)^{\alpha+\tau}}.$$

6. (4+1=5 points) The loss severity random variable X follows the exponential distribution with mean 10,000.

   Determine the coefficient of variation of the excess loss variable $Y = max(X - 30000, 0)$.

   (A) 1.0

   (B) 3.0

   (C) 6.3

   (D) 9.0

   (E) 39.2

Final answer (1 point)
Work shown (4 points)

So Answer is _____

END OF TEST PAPER