STA2001 Tutorial 5

1. 3.1-15. The life X (in years) of a voltage regulator of a car has the pdf

$$f(x) = \frac{3x^2}{7^3} e^{-(x/7)^3}, \; 0 < x < \infty$$

(a) What is the probability that this regulator will last at least 7 years?

(b) Given that it has lasted at least 7 years, what is the conditional probability that it will last at least another 3.5 years?

$f(7) = \frac{3 \cdot 7 \cdot 7}{7 \cdot 7 \cdot 7} e^{-(\frac{7}{7})^3} = \frac{3}{7e}$

$P(X \geq 7) = 1 - \frac{3}{7e}$

$f(\frac{21}{2}) = \frac{3 \cdot 3 \cdot 7 \cdot 3 \cdot 7}{7 \cdot 7 \cdot 2 \cdot 2} e^{-(\frac{3 \cdot 7}{2 \cdot 7})^3} = \frac{27}{28} e^{-\frac{27}{8}} = \frac{27}{28 e^{\frac{27}{8}}}$

$P(A|B) = \frac{P_{AB}}{P_B} = \frac{1 - \frac{27}{28 e^{\frac{27}{8}}}}{1 - \frac{3}{7e}}$ (?)

完蛋了

你个傻逼

要积分…

$\frac{1}{e}$ $\qquad$ $\frac{1}{e^{\frac{19}{8}}}$

$(0.5 - L)\frac{T}{30}$ $\qquad L = \frac{X}{\cancel{\text{total loss}}\ \ 3}$

2. 3.1-17. An insurance agent receives a bonus if the loss ratio L on his business is less than 0.5, where L is the total losses (say, X) divided by the total premiums (say, T). The bonus equals $(0.5 - L)(T/30)$ if $L < 0.5$ and equals zero otherwise. If X (in \$100,000) has the pdf

B

$$f(x) = \frac{3}{x^4},\ x > 1,$$

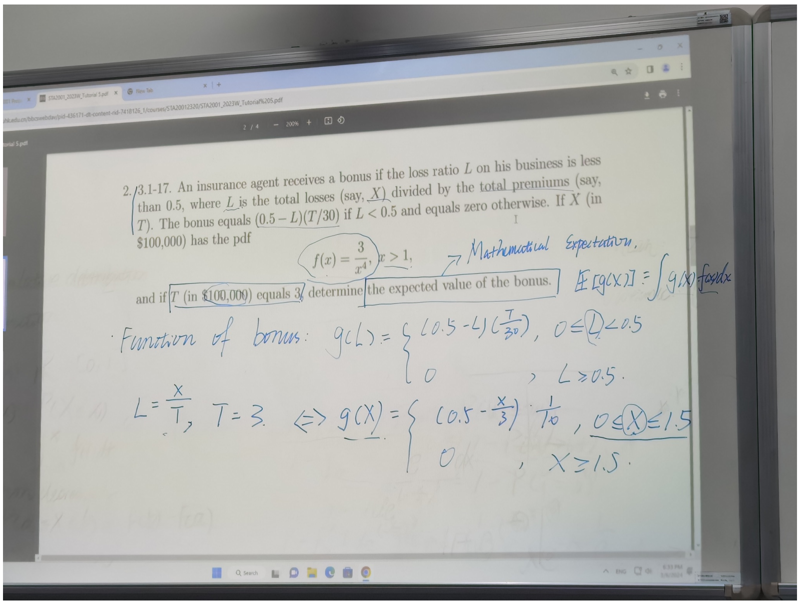
B exists: $0 < L < \frac{1}{2}$

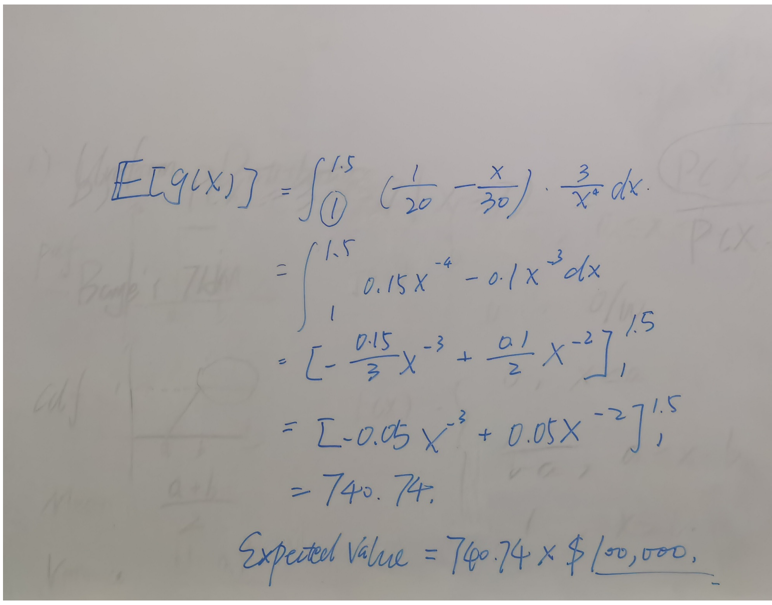
and if T (in \$100,000) equals 3, determine the expected value of the bonus.

$0 < X < \frac{3}{2}$

$3\int_0^{\frac{3}{2}} x^{-4}\,dx = -x^{-3}\Big|_0^{\frac{3}{2}} =$

真完蛋了你



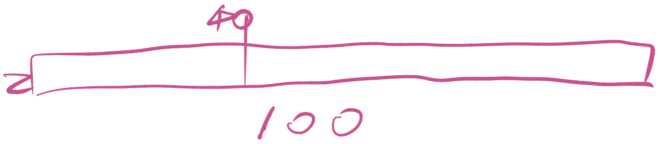


3. Buses arrive at a specified stop at 15-minute intervals starting of 7 A.M. That is, they arrive at 7, 7:15, 7:30, 7:45. If a passenger arrives at the stop at a time that is uniformly distributed between 7:00 and 7:30, find the probability that he waits

   (a) less than 5 minutes for a bus;

   (b) more than 10 minutes for a bus.

难得而有一点点水



4. 3.2-6. A certain type of aluminum screen 2 feet in width has, on the average, three flaws in a 100-foot roll.

APP?

(a) What is the probability that the first 40 feet in a roll contain no flaws?

(b) What assumption did you make to solve part (a)?