Fall 2013
Fall 2012

Quotient rule $\frac{0-(-\mu e^t)1}{[1+\mu(1-e^t)]^2}$

Math 483 Quiz 4 2007 Name____________________

1) Suppose that the moment generating function (mgf) of a random variable Y is

$$m(t) = \frac{1}{1+\mu(1-e^t)}$$

GNB(μ, $k=1$)

where $\mu > 0$ is a **known constant** and $t < -\log(\mu/(1+\mu))$. Using the mgf $m(t)$, find $E(Y)$.

$$m'(t) = \frac{d}{dt}\left[1+\mu(1-e^t)\right]^{-1} = -\left[1+\mu(1-e^t)\right]^{-2}(-\mu e^t)$$

$$= \mu e^t\left[1+\mu(1-e^t)\right]^{-2}$$

wrong deriv, −5 or −6

$$E(Y) = m'(0) = \mu(1)\left[1+\mu(1-1)\right]^{-2} = \boxed{\mu}$$

Quotient rule $m'(t) = \frac{0-(-\mu e^t)1}{[1+\mu(1-e^t)]^2} = \frac{\mu e^t}{[1+\mu(1-e^t)]^2}$

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2) Suppose that Y is a random variable with moment generating function $m(t) = \frac{1}{8}e^{3t} + \frac{4}{8}e^{5t} + \frac{2}{8}e^{7t} + \frac{1}{8}e^{11t}$. Find $E(Y)$.

Q4 11

$$m'(t) = \frac{1}{8}(3)e^{3t} + \frac{4(5)}{8}e^{5t} + \frac{2}{8}(7)e^{7t} + \frac{1}{8}(11)e^{11(t)}$$

$$m'(0) = E(Y) = \frac{3}{8} + \frac{20}{8} + \frac{14}{8} + \frac{11}{8} = \frac{48}{8} = \boxed{6}$$

3) Suppose that Y is a random variable with distribution function

$$F(y) = 1 - \frac{1}{1+y^2}$$

loglogistic $\phi=1$, $\tau=2$

for $y > 0$ and that $F(y) = 0$ otherwise. Find the probability density function (pdf) $f(y)$ of Y.

$$f(y) = F'(y) = \frac{d}{dy} - (1+y^2)^{-1} = (-1)\left(-(1+y^2)^{-2}\right)2y$$

negative −4

quotient rule $\frac{0-(-1)2y}{(1+y^2)^2}$

$$= \boxed{\begin{cases} \frac{2y}{(1+y^2)^2}, & y>0 \\ 0, & \text{else} \end{cases}}$$

4) Suppose that the probability density function for a random variable Y is given by

$$f(y) = \begin{cases} c\,y, & \text{if } 0 \le y \le 4 \\ 0, & \text{otherwise.} \end{cases}$$

a) Find c. $\int_0^4 c\,y\,dy = c\frac{y^2}{2}\Big|_0^4 = 8c \overset{set}{=} 1$

$$\boxed{c = \frac{1}{8} = 0.125}$$

b) Find $E(Y)$. $= \int_0^4 y\,\frac{1}{8}y\,dy = \int_0^4 \frac{1}{8}y^2\,dy = \frac{1}{8}\frac{y^3}{3}\Big|_0^4$

$$= \frac{64}{8(3)} = \boxed{\frac{8}{3} = 2.6667}$$

5) The lengths of human pregnancy X follow a normal distribution with mean $\mu = 266$ and standard deviation $\sigma = 16$ days.

a) What is the length of pregnancy such that 90% of pregnancies are longer?

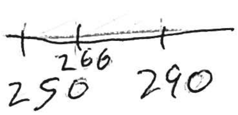
	.08
1.2	.1003

$z_0 = -1.28$

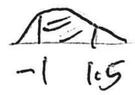
or

$x_0 = \mu + \sigma z_0 = 266 + 16(-1.28) = \boxed{245.52}$

b) Find the probability that X will be between 250 and 290.



$\frac{250-266}{16} = -1.00$, $\frac{290-266}{16} = 1.50$



$P(250 < x < 290) = 1 - .1587 - .0668 = \boxed{.7745}$

	.00
1.0	.1587
1.5	.0668

or -1