Question #95
Answer: E

$\beta =$ mean $= 4$; $\quad p_k = \beta^k / (1+\beta)^{k+1}$

n	$P(N=n)$
0	0.2
1	0.16
2	0.128
3	0.1024

x	$f^{(1)}(x)$	$f^{(2)}(x)$	$f^{(3)}(x)$
0	0	0	0
1	0.25	0	0
2	0.25	0.0625	0
3	0.25	0.125	0.0156

$f^{(k)}(x) =$ probability that, given exactly *k* claims occur, that the aggregate amount is *x*.

$f^{(1)}(x) = f(x)$; the claim amount distribution for a single claim

$$f^{(k)}(x) = \sum_{j=0}^{x} \left(f^{(k-1)}(j) \right) x \, f(x-j)$$

$f_s(x) = \sum_{k=0}^{x} P(N=k) \times f^{(k)}(x)$; upper limit of sum is really ∞, but here with smallest possible claim size 1, $f^{(k)}(x) = 0$ for $k > x$

$$f_s(0) = 0.2$$
$$f_s(1) = 0.16 * 0.25 = 0.04$$
$$f_s(2) = 0.16 * 0.25 + 0.128 * 0.0625 = 0.048$$
$$f_s(3) = 0.16 * 0.25 + 0.128 * 0.125 + 0.1024 * 0.0156 = 0.0576$$

$$F_s(3) = 0.2 + 0.04 + 0.048 + 0.0576 = 0.346$$