2.76 $P(\text{system works})$

$= P(1 - 2\text{works} \cup 3 - 4\text{works})$

$= P(1 - 2\text{works}) + P(3 - 4\text{works}) - P(1 - 2\text{works} \cap 3 - 4\text{works})$

$= (.9 + .9 - .81) + (.9 \cdot .9) - (.9 + .9 - .81) \cdot (.9 \cdot .9)$

$= .99 + .81 - .8019 = .9981$

2.78 a) $P(\text{next 3 pass}) = (0.6)(0.6)(0.6) = .216$

b) $P(\text{at least of next 3 fail}) = 1 - P(\text{next 3 pass}) = 1 - .216 = .784$

c) $P(\text{exact 1 of next 3 pass}) = 3(.6)(.4)(.4) = .288$

d) $P(\text{at most 1 of next 3 pass}) = P(\text{exact 1 pass}) + P(\text{all fail}) = .288 + (.4)^3 = .352$

e) $P(A = \text{all three pass} | B = \text{at least one pass}) = \frac{P(A \cap B)}{P(B)} = \frac{P(A)}{1 - (.4)^3} = \frac{.216}{.936} = .231$

2.93 a) $P(\text{good risk}|\text{at least one cite}) = \frac{(.1)(.3)}{(.01)(.3) + (.3)(.5) + (.5)(.2)} = \frac{.03}{.28} = .107$

b) $P(\text{median risk}|\text{at least one cite}) = \frac{(.3)(.5)}{.28} = .536$

2.94 $P(\text{good risk}|\text{no cites in three years}) = \frac{(.9)^3(.3)}{(.9)^3(.3) + (.7)^3(.5) + (.5)^3(.2)} = \frac{.2187}{.4152} = .527$

3.10 a) $T = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

b) $X = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6\}$

c) $U = \{0, 1, 2, 3, 4, 5, 6\}$

d) $Z = \{0, 1, 2\}$

3.12 a) The second series is a good pdf. This is because the sum of its numbers is 1.
The sum of first series is .7 and of third is 1.1. So they are not valid pdf.

b) $P(2 \le X \le 4) = .1 + .1 + .3 = .5$
$P(X \le 2) = .4 + .1 + .1 = .6$
$P(X \ne 0) = 1 - .4 = .6$

c) $\sum p(x) = \sum c(5 - x) = 15c = 1 \implies c = \frac{1}{15}$

3.16 a) $P(x = 0) = (.8)^4 (\frac{4!}{0!4!}) = .4096$
$P(x = 1) = (.8)^3(.2)(\frac{4!}{1!3!}) = .4096$
$P(x = 2) = (.8)^2(.2)^2(\frac{4!}{2!2!}) = .1536$
$P(x = 3) = (.8)^1(.2)^3(\frac{4!}{3!1!}) = .0256$
$P(x = 4) = (.2)^4(\frac{4!}{4!0!}) = .0016$

c) x=0 or 1

1

d) $P(x \geq 2) = .1536 + .0256 + .0016 = .1808$

3.22

x	0	1	2	3	4	5	≥ 6
$p(x)$	.06	.13	.20	.28	.25	.05	.03

a) $P(x = 2) = .20$

b) $P(x > 3) = .25 + .05 + .03 = .33$

c) $P(2 \leq x \leq 5) = .2 + .28 + .25 + .05 = .78$

d) $P(2 < x < 5) = .28 + .25 = .53$

3.28 $E(x) = 2.06$
$V(x) = .9364$
std. dev.$= .9677$
$V(x) = .9364$

3.46 a) $P(x \leq 2) = B(2; 25, .05) = .873$

b) $P(x \geq 5) = 1 - P(x \leq 4) = 1 - B(4; 25, .05) = .007$

c) $P(1 \leq x \leq 4) = P(x \leq 4) - P(x \leq 0) = B(4; 25, .05) - B(0; 25, .05) = .716$

d) $P(x = 0) = P(x \leq 0) = B(0; 25, .05) = .277$

e) Expected value$= np = (25)(.05) = 1.25$
std. dev.$= \sqrt{npq} = \sqrt{25(.05)(.95)} = 1.090$

3.76 a) $P(x = 1) = \frac{e^{-.2}(.2)^1}{1!} = .164$

b) $P(x \leq 2) = 1 - P(x = 0) - P(x = 1) = 1 - \frac{e^{-.2}(.2)^0}{0!} - .164 = .017$

c) $P(x = 0) = .819$
so $P(x1 = 0 \cap x2 = 0) = (.819)^2 = .670$

3.80 a) $P(x = 5) = \frac{e^{-5}(5)^5}{5!} = .175$

b) $P(x \geq 3) = 1 - P(x \leq 2) = 1 - F(2; 5) = 1 - .125 = .875$

c) $E(x) = .75 * 5 = 3.75$

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