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To: MATH141.03
Subject: 3 practice problems for section 6.5

Practice Problems – Section 6.5

- Three court judges render their decisions independently of one another. Their respective probabilities of voting YES on capital punishment are 0.7, 0.6, & 0.8. In order for a prisoner to be given capital punishment, at least 2 of the three judges must say YES. What is the probability that a random prisoner is given capital punishment?
- A security system at a bank has 10 independently operating alarms, each of which detects a burglar with probability 0.95.
 - What is the probability that a burglar is detected by at least 3 alarms?
 - What is the probability that a burglar sets off at most 7 alarms?
 - What is the probability that none of the alarms go off when a burglar breaks in?
- Nike manufactures shoes so that they will last at least 6 months, with the chance of a defect during this period being 7% for any pair. An elite runner wants to buy enough pairs of shoes to have at least a 98% chance of having at least two good pairs of shoes on hand at the end of six months. How many pairs of shoes should she buy?

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KEY

$$1. \quad P(2Y \text{ or } 3Y) = .7 \cdot .6 \cdot .8 + .7 \cdot .8 \cdot .6 + .6 \cdot .8 \cdot .7 + .7 \cdot .6 \cdot .8$$
$$2. \quad a) \quad 1 - P(0 \text{ or } 1 \text{ or } 2) = 1 - (.05^{10} + 10 \cdot .05^9 \cdot .95 + 45 \cdot .05^8 \cdot .95^2)$$
$$b) \quad 1 - P(8 \text{ or } 9 \text{ or } 10) = 1 - (45 \cdot .05^2 \cdot .95^8 + 10 \cdot .05 \cdot .95^9 + .95^{10})$$
$$c) \quad .05^{10}$$

$$3) \quad 1 - P(0 \text{ or } 1 \text{ good}) \leq .02 \quad \text{or} \quad .07^x + x \cdot .07^{x-1} \cdot .93 \leq .02$$

x	$.07^x + x \cdot .07^{x-1} \cdot .93$
2	.1351
3	.014 ←
4	.0013

3 pairs suffice