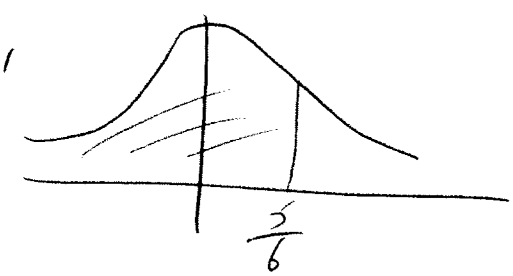
MATH 30440, SEC 01, SPRING 2010

HOMEWORK 6 SOLUTIONS

5.23) a) $P(X > 5) = P\left(\frac{X-10}{6} > \frac{5-10}{6}\right)$

$$= P\left(Z > -\frac{5}{6}\right)$$

From table,



$$P\left(Z < \frac{5}{6}\right) = .7977,$$

so $P\left(Z > -\frac{5}{6}\right) = .7977$

b) .6827

c) .3695

d) .9522

e) .1587

5.24) a) $P(\text{one particular scored below } 600)$

$$= P(X < 600) = P\left(Z < \frac{600-500}{100}\right)$$

$$= P(Z < 1)$$

$$= .8413$$

$$P(\text{all } 5) = (.8413)^5 = .4215$$

b) $P(\text{one particular scored above } 640)$

$$= P(Z > 1.4)$$

$$= .0808$$

$$P(\text{exactly } 3) = \binom{5}{3}(.0808)^3(.9192)^2$$

$$= .0507$$

5.27) Want $P(X > L) = .95$,

$X = \text{Normal}(2000, 85^2)$

Same as $P\left(Z > \frac{L - 2000}{85}\right) = .95$

From table, $P(Z > -1.64) = .95$

So Want $\frac{L - 2000}{85} = -1.64$

$L = 1860.6$

5.28) Want $P(1.19 < X < 1.21)$ when

$X = N(1.2, (.005)^2)$

This is same as

$P\left(\frac{-.01}{.005} < Z < \frac{.01}{.005}\right)$

or $P(-2 < Z < 2) = .9544$

So $P(\text{defective}) = 1 - .9544$

$= .0456$

5.31) $X = N(4.4 \times 10^6, 9 \times 10^{10})$

$$P(X > 4 \times 10^6) = P\left(Z > \frac{-.4 \times 10^6}{3 \times 10^5}\right)$$

$$= P(Z > -1.33)$$

$$= .9082$$

So yes, he should contract

5.33) a) .099

b) .011

c) .89

5.37) a) $P(X>2) = \int_2^\infty e^{-x}\,dx$

$$= [-e^{-x}]_2^\infty$$

$$= e^{-2} = .135$$

b) $P(X>3 \mid X>2) = P(X>1)$ (Memorylessness)

$$= e^{-1} = .368$$

5.38) By memorylessness, it doesn't matter for how long the radio has been working

P(Works for 10 more years)

$= P(\text{exponential}(\frac{1}{8}) > 10)$

$= \int_{10}^{\infty} \frac{1}{8} e^{-\frac{x}{8}} dx = e^{\frac{-10}{8}} = .2865$

5.39) a) By memorylessness,

$P(X > 30000 \mid X > 10{,}000) = P(X > 20000)$

$= .3679$

b) $P(X > 30 \mid X > 10) = \frac{P(X > 30)}{P(X > 10)}$

$= \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{3}$