8) B-3.12)  $\sigma = \sigma$ $k = 1,2,3$

$\{X \geq k\sigma\} = \begin{cases} .1587 & k=1 \\ .0228 & k=2 \\ .0013 & k=3 \end{cases}$

$\{|X| \leq k\sigma\} = \begin{cases} .6826 & k=1 \\ .9544 & k=2 \\ .9974 & k=3 \end{cases}$

$k=1: (X \geq \sigma) = 1 - \Phi(1) = 1 - .8413 = .1587$

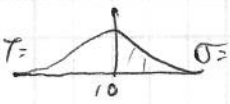
$\Rightarrow 1 - \Phi(k) = 1 - .9772 = .0228$

$1 - .9987 = .0013$

$(\Phi(k) - .5)2 = (.8413 - .5)2 = .6826$

$= \Phi(k)2 - 1 \quad (.9772)2 - 1 = .9544 - 1 = .9544$

$(.9987)2 - 1 = .9974 - 1 = .9974$

9) B-3.13)  $T = \quad \sigma = 10$

$P(T \leq 59F) = (59-32)\frac{5}{9} = 270 \quad \frac{135}{9} = 15$

$P(T \leq 15C) = \Phi(.5) = .6195$

10) B-3.15)

a) $a = \pi r^2/2 \quad f_{(X,Y)}(x,y) = 2/\pi r^2$ (in SC) $\quad f_{(X,Y)}(x,y) = 0$ (else)

$f_{(X,Y)}(x,y) = \begin{cases} 2/\pi r^2 & X,Y \text{ in semi circle} \\ 0 & \text{otherwise} \end{cases}$

b) $[-\sqrt{r^2-y^2}, \sqrt{r^2-y^2}]$

$f_Y(y) = \int_{-\sqrt{r^2-y^2}}^{\sqrt{r^2-y^2}} \frac{2}{\pi r^2} dx = \begin{cases} \frac{4\sqrt{r^2-y^2}}{\pi r^2} & \text{if } 0 \leq y \leq r \\ 0 & \text{else} \end{cases} \quad \frac{2\sqrt{r^2-y^2}}{\pi r^2} + \frac{2\sqrt{r^2-y^2}}{\pi r^2} = \frac{4\sqrt{r^2-y^2}}{\pi r^2}$

$E[Y] = \frac{4}{\pi r^2} \int_0^r y\sqrt{r^2-y^2}\, dy = \frac{4r}{3\pi} \quad z = r^2 - y^2$

c) D: semicircle

$E[Y] = \iint_{(x,y)\in D} y f_{X,Y}(x,y)\, dx\, dy = \int_0^{\pi}\int_0^r \frac{2}{\pi r^2} s(\sin\theta)\, s\, ds\, d\theta = \int_0^{\pi} \frac{2r^3 \sin\theta}{3\pi r^2} d\theta = \frac{2r}{3\pi}(-\cos\theta)\Big|_0^{\pi}$

$= \frac{4r}{3\pi}$

$\frac{2r}{3\pi}(1 - -1)$