1. a) $(1*8 + 2*7 + 3*6 + 4*5) * 2 = 120$

$8 \quad 14 \quad 18 \quad 20$

$Pr(X=x) = \frac{(x+1)(8-x)}{120}$

b) $\frac{18}{120} + \frac{14}{120} + \frac{8}{120} = \frac{40}{120} = \boxed{\frac{1}{3}}$

2. a) $Pr(X \text{ is divisible by } n) = f(n) + f(2n) + f(3n) + \ldots$

$= \sum_{x=1}^{\infty} f(nx)$

$= \sum_{x=1}^{\infty} \frac{1}{c(p)(xn)^p} = \frac{1}{\sum_{x=1}^{\infty} \frac{1}{x^p}} * \frac{1}{n^p} * \sum_{x=1}^{\infty} \frac{1}{x^p}$

$= \boxed{\frac{1}{n^p}}$

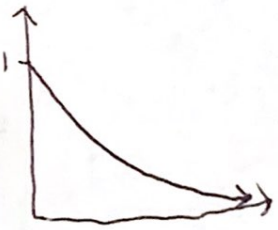
b) X is even if it is divisible by $n=2$

X is odd if it isn't even

so $Pr(X \text{ is odd}) = 1 - \frac{1}{2^p}$

3. a) $c\int_0^{\infty} e^{-2x}\,dx = 0 \quad c\left(-e^{-2x}/2\Big|_0^{\infty}\right) \quad \lim_{x\to\infty} e^{-2x} = 0$

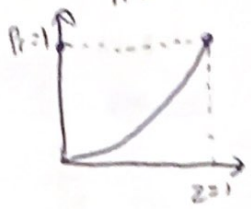
$c*(0 + e^0/2) \quad \frac{1}{2}c = 1 \quad \boxed{c=2}$



b) $2\int_1^2 e^{-2x} \quad -e^{-2x}\Big|_1^2 = (e^{-4} + e^{-1}) \approx \boxed{.3496}$

4. a) $Pr(X=-1) = 0.1$
b) $Pr(X<0) = 0.1$
c) $Pr(X \le 0) = 0.2$
d) $Pr(X=1) = 0$
e) $Pr(0<X\le 3) = 0.6$
f) $Pr(0<X<3) = 0.4$
g) $Pr(0\le X\le 3) = 0.7$
h) $Pr(1<X\le 2) = 0$
i) $Pr(1\le X\le 2) = 0$
j) $Pr(X>5) = 0$
k) $Pr(X\ge 5) = 0$
l) $Pr(3\le X\le 4) = 0.2$

15. $P_r(Z=z) = \frac{\pi z^2}{\pi 1^2} = z^2$



16. $\int_0^{x_0} \frac{1}{2} e^{-x} dx = 0.4$

$-e^{-x}\Big|_0^{x_0} = 0.8$

$-e^{-x_0} + e^0 = 0.8$

$e^{-x_0} = 0.2$

$-x_0 = \ln(0.2)$

$\boxed{x_0 = 1.609}$