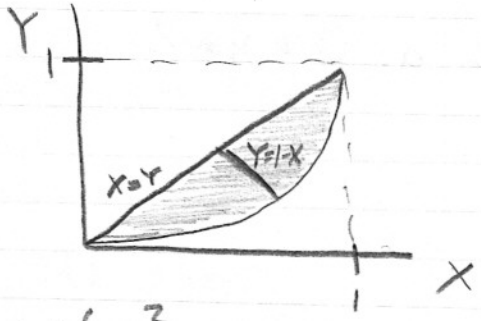
II. $\int_0^1 \int_{x^2}^{x} c \, dy \, dx = 1$

$c \int_0^1 [y]_{x^2}^{x} = c \int_0^1 x - x^2 \, dx$

$= c\left[\frac{x^2}{2} - \frac{x^3}{3}\right]_0^1$

$= c\left[\frac{1}{2} - \frac{1}{3}\right] = 1$

$c = 6$



a. $f(x) = \int_{x^2}^{x} 6 \, dy = 6x - 6x^2$

$f(y) = \int_{y}^{\sqrt{y}} 6 \, dx = 6\sqrt{y} - 6y$

b. $E(X) = \int_0^1 6x^2 - 6x^3$

$E(Y) = \int_0^1 6y^{3/2} - 6y^2$

c. $E(X^2) = \int_0^1 6x^3 - 6x^4$

$E(Y^2) = \int_0^1 6y^{5/2} - 6y^3$

$Var(X) = E(X^2) - [E(X)]^2$

d. $P(X \le .5) = \int_0^{.5} 6x - 6x^2$

$P(Y \le .5) = \int_0^{.5} 6\sqrt{y} - 6y$

$P(X + Y \le 1) = \int_0^{.5} \int_{x^2}^{x} 6 \, dy \, dx + \int_{.5}^{1} \int_{x^2}^{1-x} 6 \, dy \, dx$

III. a. $\int_1^2 cx^{-2} \, dx = 1 = c[-x^{-1}]_1^2 = c\left(1 - \frac{1}{2}\right)$

$c = 2$

b. $F(a) = \int_1^a 2x^{-2} \, dx = [-2x^{-1}]_1^a = 2 - \frac{2}{a}$

c. $P(X \le 1.3) = 2 - \frac{2}{1.3}$

$P(X^2 \ge 2) = P(X \ge \sqrt{2}) = 1 - \left(2 - \frac{2}{\sqrt{2}}\right)$

$P(1.1 \le X \le 1.6) = \left(2 - \frac{2}{1.6}\right) - \left(2 - \frac{2}{1.1}\right) = \frac{2}{1.1} - \frac{2}{1.6}$

d. $E(X) = \int_1^2 2x^{-1} \, dx$

$E(X^2) = \int_1^2 2 \, dx$