Q2

1 Point

Given a random variable U that is uniform on $(0, 1)$, how can you simulate from a continuous distribution with cdf $F(x) = 1 - \left(\frac{c}{x}\right)^a, x \geq c$ for some $a, c > 0$? Show details.

$$F(x) = 1 - \left(\frac{c}{x}\right)^a$$

$$\Rightarrow \quad X = 1 - \left[c/F^{-1}(x)\right]^a$$

$$c/F^{-1}(x) = (1 - X)^{\frac{1}{a}}$$

$$F^{-1}(x) = c/(1 - x)^{\frac{1}{a}}$$

$\Rightarrow$ then X can be generate from

$c/(1-U)^{\frac{1}{a}}$, since $1-U$ still $\sim U(0,1)$

$\Rightarrow \quad c/U^{\frac{1}{a}}$

$\Rightarrow$ Conclusion:

we can generate $X \sim F(x)$ by $c/U^{\frac{1}{a}}$, which $U \sim U(0,1)$, for $U \neq 0$.