② $f(x) = r x^{r-1}$, $x \geq 1$, $r \geq 2$

a) $F(x) = \int_1^x r y^{r-1} dy = 1 - \frac{1}{x^r}$

$1 - \frac{1}{x^r} = u$

$-\frac{1}{x^r} = u - 1$

$\frac{1}{x^r} = 1 - u$

$x^r = \frac{1}{1-u}$

$x = \sqrt[r]{\frac{1}{1-u}}$

$\therefore F^{-1}(x) = \sqrt[r]{\frac{1}{1-x}}$

1. Generate $\underline{U} \sim U(0,1)$

2. Map $F^{-1}(\underline{U})$

b) $0 < \theta < \frac{\pi}{2}$

$\underbrace{p(\theta)}_{f(\theta)} = \sin(\theta)$

$g = Unif(0, \frac{\pi}{2})$

$g(x) = \frac{2}{\pi}$

1. Generate $X \sim g$, $U \sim U(0,1)$

2. Accept X if

$U \leq \frac{f(x)}{M g(x)} = \frac{\sin(x)}{\frac{\pi}{2} \cdot \frac{2}{\pi}}$

$= \sin(x)$

$f(\theta) \leq M g(\theta)$

$\sin(\theta) \leq M \frac{2}{\pi}$

$M \geq \frac{\pi}{2} \sin(\theta)$

$\geq \frac{\pi}{2}$

$M = \frac{\pi}{2}$