Pre-class work

Follow the steps from the study guide and implement a Metropolis-Hastings algorithm to draw samples from this target distribution:

```
def f(x):
    Z = 24.44321494051954
    if abs(x) > 7:
        return 0
    elif abs(x) > 3:
        return 3 * (1 - (x / 7) ** 2) ** 0.5 / Z
    elif abs(x) > 1:
        return (
            (3 - abs(x)) / 2 -
            3/7 * 10**0.5 * ((3 - x**2 + 2*abs(x))**0.5 - 2)
        ) / Z
    elif abs(x) > 0.75:
        return (9 - 8 * abs(x)) / Z
    elif abs(x) > 0.5:
        return (3 * abs(x) + 0.75) / Z
    else:
        return 2.25 / Z
```

Use a normal distribution centered on the current state, x, with a standard deviation of 2 as your proposal distribution.

$$g(y \mid x) = N(y \mid x,\ 2^2)$$

Be careful: Mathematically, we write the normal distribution using its variance (2^2), but in Python (and R) we call the normal random function using its standard deviation (2).

Plot the distribution over states from this simulation.

- Run the simulation for at least 100,000 steps.
- Take every 100th step from your states, so x_{100}, x_{200}, x_{300}, …, and plot a histogram of these values over true distribution, $f(x)$.
- If your simulation is running properly, you should get a figure that looks like this: