Vibing Math (Floor Function Problem)

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1 Question

Find x if

$$x\lfloor x\lfloor x\lfloor x\rfloor\rfloor\rfloor = 88$$

Here $x > 0$, $\lfloor x \rfloor$ is the floor function.

2 Solution

Approximating given expression as $x^4 \approx 88$, we have

$$x \approx 3.0628$$

Also, the given expression can be rewritten as:

$$\lfloor x\lfloor x\lfloor x\rfloor\rfloor\rfloor = \frac{88}{x}$$

This implies that $\frac{88}{x}$ is an integer. By substituting our approximate value of x, we get

$$\frac{88}{x} \approx 28.7318$$

This further means that

$$x = \frac{88}{28}\left(= \frac{22}{7}\right) \textit{ or } \frac{88}{29}$$

Substituting back and checking, we find that,

$$\frac{22}{7}\left\lfloor \frac{22}{7}\left\lfloor \frac{22}{7}\left\lfloor \frac{22}{7}\right\rfloor\right\rfloor\right\rfloor = 88$$

Therefore

$$\boxed{x = \frac{22}{7}}$$