1

Multiply both nominator and denominator of $\frac{2}{5+2*\sqrt{6}}$ by $5-2*\sqrt{6}$ and apply $(a+b)(a-b)=a^2-b^2$: $\frac{2*(5-2*\sqrt{6})}{(5+2*\sqrt{6})(5-2*\sqrt{6})}=\frac{2*(5-2*\sqrt{6})}{25-24}=2*(5-2*\sqrt{6})$.

Now, $\sqrt{6}$ is a little bit more than 2 (~2.5), hence $2*(5-2*\sqrt{6})\approx 2(5-2*2.5)=0$;

So we have: $\sqrt{\sqrt{96}+\frac{2}{5+2*\sqrt{6}}}\approx\sqrt{\sqrt{96}+0}=\sqrt{\sqrt{96}}$ --> $\sqrt{96}$ is more than 9 but less than 10 (~9.5), hence $\sqrt{\sqrt{96}}\approx\sqrt{9.5}$, which is more than 3 but less than 4.

Answer: C.

Or another way, using the same approximations as above:

Answer: C.

2

Even roots from negative number is undefined on the GMAT (as GMAT is dealing only with Real Numbers): $\sqrt[even]{negative}=undefined$, for example $\sqrt{-25}=undefined$.

Odd roots will have the same sign as the base of the root. For example, $\sqrt[3]{125}=5$ and $\sqrt[3]{-64}=-4$.

The above question is quite tricky:

$\sqrt[3]{-89}$ is **more** than -5 (as $-5^3=-125$) but **less** than -4 (as $-4^3=-64$) --> $-5<x<-4$, (actually it's ≈ -4.5). So the the range would be between -5 and -4. The only answer choice to cover this range is A (-9, 10).

Answer: A.

3

$\sqrt[6]{x}=6$ --> $x=6^6$. So, $\sqrt{x^6}=x^3=(6^6)^3=6^{18}$.

Answer: D.

4

Real Numbers are: Integers, Fractions and Irrational Numbers. Non-real numbers are even roots (such as square roots) of negative numbers.

We have $\sqrt{1-\sqrt{2-\sqrt{x}}}$. For $x=5$ expression becomes: $\sqrt{1-\sqrt{2-\sqrt{5}}}$ and $2-\sqrt{5}<0$, thus square root from this expression is not a real number.

Answer: E.

5

There are many ways to solve this problem, for example:

$$\sqrt{\sqrt[3]{0.000064}}=\sqrt[6]{0.000064}=\sqrt[6]{\frac{2^6}{10^6}}=\frac{2}{10}=0.2.$$

Answer: E.