Answer on Question #85151 – Math – Algebra

Question

Prove that $2n > 1 + \sqrt[n]{2n-1}, \forall n \geq 2,$ using the inequalities.

Solution

For $n \geq 2$:

$$\sqrt[n]{2n-1} > 0 \qquad (1)$$

$$2n - 1 > 1$$

$$1 - \frac{1}{n} > 0$$

$$(2n-1)^{1-\frac{1}{n}} > (2n-1)^0 = 1 \qquad (2)$$

$$(2n-1)^{1-\frac{1}{n}} - (1)^{1-\frac{1}{n}} > 0$$

Based on (1) and (2), it is true that

$$\sqrt[n]{2n-1}\left((2n-1)^{1-\frac{1}{n}} - 1\right) > 0,$$

hence

$$(2n-1) - \sqrt[n]{2n-1} > 0$$

$$2n > 1 + \sqrt[n]{2n-1}$$

Q.E.D.

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