The PROOF OF PROPOSITION 5.3.2 in Dr. SHIRLEY's FORMAT.

Proposition 5.3.2: For all integers $n \geq 3$, $2n+1 < 2^n$.

Proof: [By Mathematical Induction]

Let $n=3$. $2n+1 = 2\times 3+1 = 7$, by substitution.

$2^n = 2^3 = 8$, by substitution.

$7 < 8$. [END OF BASIS STEP]

$\therefore$ For $n=3$, $2n+1 < 2^n$, by substitution.

Now, suppose that k is any integer with $k \geq 3$.

Suppose that $2k+1 < 2^k$. [The Induction Hypothesis]

[NTS: $2(k+1)+1 < 2^{(k+1)}$]

WORK SPACE:

$$\begin{aligned} &2(k+1)+1 \\ &= 2k+2+1 \\ &= 2k+3 \\ &= (2k+1)+2 \\ &< 2^k + 2 \\ &< 2^k + 2^k \\ &= 2\cdot 2^k \\ &= 2^{k+1} \end{aligned}$$

$$\therefore\ 2(k+1)+1 = 2k+2+1 = (2k+1)+2$$

Since $k \geq 3$, $2 < 2^k$.

By the Induction Hypothesis, $2k+1 < 2^k$.

$\therefore\ (2k+1)+2 < 2^k + 2^k = 2\cdot 2^k = 2^{k+1}$

$\therefore\ (2k+1)+2 < 2^{k+1}$.

$\therefore\ 2(k+1)+1 < 2^{k+1}$, by substitution.

$\therefore$ By Direct Proof, For all integers k, $k \geq 3$, If $2k+1 < 2^k$, Then $2(k+1)+1 < 2^{k+1}$.

[END of Induction Step].

$\therefore$ For all integers $n \geq 3$, $2n+1 < 2^n$, by MATHEMATICAL INDUCTION.

QED