Binomial Theorem Ex 18.1 Q8

$$3^{3n}-26n-1$$
$$=\left(3^3\right)^n-26n-1$$
$$=27^n-26n-1$$
$$=(1+26)^n-26n-1$$
$$=\left({}^nC_0+{}^nC_1(26)^1+{}^nC_2(26)^2+\ldots\ldots+{}^nC_n(26)^n\right)-26n-1$$
$$=\left(1+26n+676\,{}^nC_2+\ldots\ldots+676(26)^{n-2}\right)-26n-1$$
$$=676\left({}^nC_2+\ldots\ldots+(26)^{n-2}\right)$$

$\therefore$ $3^{3n}-26n-1$ **is divisible for** $n\in N$.

Hence, proved

Binomial Theorem Ex 18.1 Q9

We have,

$$(1.1)^{10000}=(1+0.1)^{10000}$$
$$={}^{10000}C_0+{}^{10000}C_1(0.1)+{}^{10000}C_2(0.\;1)^2+\ldots+{}^{10000}C_{10000}(0.1)^{10000}$$
$$=1+10000\times(0.1)+\text{ other positive terms}$$
$$=1+1000+\text{ other positive terms}$$
$$=1001+\text{ other positive terms}>1000$$

$$\therefore\quad (1.1)^{10000}>1000$$

Binomial Theorem Ex 18.1 Q10

$$(1.2)^{4000}=(1+0.2)^{4000}$$
$$={}^{4000}C_0(0.2)^0(1)^{4000}+{}^{4000}C_1\times(0.2)^1\times1^{3999}+\ldots\ldots\ldots+{}^{4000}C_{400}(0.2)^{4000}1^0$$
$$=1+4000\times0.2\times1+\ldots\ldots\ldots+(0.2)^{4000}$$
$$=1+800+\ldots\ldots\ldots+(0.2)^{4000}$$

Here, we clearly observe $(1,2)^{4000}$ **is** less **than** (801) **thus,** $(1.2)^{4000}<800$.

Binomial Theorem Ex 18.1 Q11

$$(1.01)^{10}+(1-0.01)^{10}=(1+0.01)^{10}+(1-0.01)^{10}$$
$$=\left({}^{10}C_1+{}^{10}C_2\frac{1}{10^2}+{}^{10}C_3\frac{1}{10^3}\ldots+{}^{10}C_{10}\frac{1}{10^{10}}\right)+\left({}^{10}C_1-{}^{10}C_2\frac{1}{10^2}+{}^{10}C_3\frac{1}{10^3}-{}^{10}C_4\frac{1}{10^4}+\ldots\right)$$
$$=2\left({}^{10}C_1-{}^{10}C_3\frac{1}{10^3}+{}^{10}C_5\frac{1}{10^5}+{}^{10}C_7\frac{1}{10^7}+{}^{10}C_9\frac{1}{10^9}\right)$$
$$=2\left(10+\frac{10!}{3!7!}\frac{1}{1000}+\frac{10!}{5!5!}\frac{1}{(10)^5}+\frac{10!}{7!3!}\times\frac{1}{10^7}+\frac{10!}{9!1!}\frac{1}{10^9}\right)$$
$$=2\left(10+\frac{9\times8}{3\times2\times1000}+\frac{9\times8\times7\times6}{5\times4\times3\times2\times10^5}+\frac{9\times8}{3\times2\times10^7}+\frac{1}{10^8}\right)$$
$$=2.0090042$$

Binomial Theorem Ex 18.1 Q12

$$
\begin{aligned}
2^{4n+4} - 15n - 16 &= 2^{4(n+1)} - 15n - 15 - 1 \\
&= (16)^{(n+1)} - 15(n+1) - 1 \\
&= (1+15)^{n+1} - 15(n+1) - 1 \\
&= \left[{}^{n+1}C_0 + {}^{n+1}C_1(15) + {}^{n+1}C_2(15)^2 + \ldots\ldots. + {}^{n+1}C_{n+1}(15)^{n+1}\right] - 15(n+1) - 1 \\
&= \left[1 + 15(n+1) + {}^{n+1}C_2(15)^2 + \ldots\ldots. + {}^{n+1}C_{n+1}(15)^{n+1}\right] - 15(n+1) - 1 \\
&= 225\left[{}^{n+1}C_2 + \ldots\ldots. + {}^{n+1}C_{n+1}(15)^{n-1}\right] \\
&= 225 \times \text{natural number}
\end{aligned}
$$

*********** END **********