

Exam Review: Exponential Functions

a)

x	y	1st diff	2nd diff
0	5	> 2	
1	7	> 3	
2	12	> 5	> 2
3	19	> 7	> 2
4	28	> 9	> 2

not constant; ratios are not constant either

b)

x	y	1st diff	ratios
2	7	> 2	
3	9	> 4	> 2
5	13	> 4	> 2
8	21	> 8	> 2
11	37	> 16	> 2

ratios are constant.

Neither

Exponential (Growth)

2. a) 3^{-4}
 $= \frac{1}{3^4}$
 $= \frac{1}{81}$

b) $\frac{(2x^2y)^3}{x^7y^2}$
 $= \frac{2^3(x^2)^3y^3}{x^7y^2}$
 $= \frac{8x^6y^3}{x^7y^2}$
 $= \frac{8y}{x}$

c) -5.735^0
 $= -1$
 negative

d) $\left(\frac{x}{3}\right)^{-3}$
 $= \left(\frac{3}{x}\right)^3$
 $= \frac{3^3}{x^3}$
 $= \frac{27}{x^3}$

3. a) $16^{\frac{5}{4}}$
 $= (16^{\frac{1}{4}})^5$
 $= (\sqrt[4]{16})^5$
 $= 2^5$
 $= 32$

b) $9^{-\frac{5}{2}}$
 $= \frac{1}{9^{\frac{5}{2}}}$
 $= \frac{1}{(9^{\frac{1}{2}})^5}$
 $= \frac{1}{(\sqrt{9})^5}$
 $= \frac{1}{(3)^5}$
 $= \frac{1}{243}$

$$\begin{aligned}
 4.a) \quad 3^{2x-3} &= 243 \\
 3^{2x-3} &= 3^5 \\
 2x-3 &= 5 \\
 2x &= 5+3 \\
 2x &= 8 \\
 \frac{2x}{2} &= \frac{8}{2} \\
 x &= 4
 \end{aligned}$$

$$\begin{aligned}
 b) \quad 27^{x+2} &= 9^{x-2} \\
 (3^3)^{x+2} &= (3^2)^{x-2} \\
 3^{3x+6} &= 3^{2x-4} \\
 3x+6 &= 2x-4 \\
 3x-2x &= -4-6 \\
 x &= -10
 \end{aligned}$$

$$\begin{aligned}
 5.a) \quad &2016 \text{ is } 5 \text{ years from now} \\
 &\text{set } t=5 \quad 0.08(5) \\
 N &= 5000000(2)^{0.08(5)} \\
 &= 5000000(2)^{0.4} \\
 &= 5000000(1.3195\dots) \\
 &\approx 6597540 \text{ cell phones}
 \end{aligned}$$

$$\begin{aligned}
 b) \quad &\text{set } N = 10000000 \\
 \frac{10000000}{5000000} &= \frac{5000000(2)^{0.08t}}{5000000} \\
 2^1 &= 2^{0.08t} \\
 1 &= 0.08t \\
 \frac{1}{0.08} &= \frac{0.08t}{0.08} \\
 12.5 &= t \\
 t &= 12.5 \text{ years}
 \end{aligned}$$