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1) Let $x^k + y^k = a^k$, $(a, k > 0)$ and $\left(\frac{dy}{dx}\right)+\left(\frac{y}{x}\right)^{\frac{1}{3}} = 0$, then k is

a) $\frac{1}{3}$ c) $\frac{2}{3}$
b) $\frac{3}{2}$ d) $\frac{4}{3}$

2) Let the function, $f : [-7, 0] \to R$ be continuous on $[-7, 0]$ and differentiable on $(-7, 0)$. If $f(-7) = -3$ and $f'(x) \leq 2$, for all $x \in (-7, 0)$, then for all such functions f, $f(-1) + f(0)$ lies in the interval:

a) $[-6, 20]$ c) $(-\infty, 11]$
b) $(-\infty, 20]$ d) $[-3, 11]$

3) If $y = y(x)$ is the solution of the differential equation $e^y\left(\frac{dy}{dx}\right) - 1 = e^x$ such that $y(0) = 0$, then $y(1)$ is equal to

a) $\log_e 2$ c) $2 + \log_e 2$
b) $2e$ d) $1 + \log_e 2$

4) Five numbers are in A.P, whose sum is 25 and product is 2520. If one of these five numbers is $\frac{-1}{2}$, then the greatest number amongst them is

a) 16 c) 7
b) 27 d) $\frac{21}{2}$

5) If the system of linear equations

$$2x + 2ay + az = 0$$

$$2x + 3by + bz = 0$$

$$2x + 4cy + cz = 0,$$

where $a, b, c \in R$ are non-zero and distinct, has non-zero solution, then

a) $a + b + c = 0$ c) $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P
b) a, b, c are in A.P d) a, b, c are in G.P