HOMEWORK EXERCISES (TIME: 10 MINUTES)

23. If $2^x = \frac{1}{32}$, then $x^3 = ?$

(A) $\frac{1}{32,768}$
(B) $\frac{1}{125}$
(C) -8
(D) 125
(E) -125

24. If $x^{-5} = 300$, which of the following inequalities is true?

(A) $-4 < x < -3$
(B) $\frac{1}{4} < x < \frac{1}{3}$
(C) $\frac{1}{3} < x < \frac{1}{2}$
(D) $-\frac{1}{3} < x < -\frac{1}{4}$
(E) $3 < x < 4$

25. If x, y, and z are real numbers and $xy^{\frac{4}{3}} = z^0$, which of the following MUST be true of x ?

(A) $x = 0$
(B) $x = 1$
(C) $x = y^{\frac{3}{4}}$
(D) $x = y^{-\frac{4}{3}}$
(E) $x = y^{\frac{3}{4}}z$

26. For all nonzero numbers a, b, and c, $\frac{a^3b+b^3c+ac^3}{(abc)^{-2}} = ?$

(A) $a^5b^3c^2 + a^2b^5c^3 + a^3b^2c^5$
(B) $abc(a+b+c)$
(C) $(abc)^2(a^2b + b^2c + a^2c)$
(D) $\frac{a^2+b^2+c^2}{abc}$
(E) $\frac{a}{bc^2} + \frac{b}{a^2c} + \frac{c}{ab^2}$

27. One light-year, or the distance light travels in a year, is approximately 9.46×10^{15} meters. Approximately how many kilometers does light travel in a day? (Assume 365 days to a year.)

(A) 3.45×10^{10}
(B) 3.45×10^{14}
(C) 2.59×10^{10}
(D) 2.59×10^{14}
(E) 2.59×10^{16}

28. If n^3 is equal to 6.4×10^{-8}, then $n = ?$

(A) 4.0×10^{-2}
(B) 4.0×10^{-3}
(C) 4.0×10^{-4}
(D) 2.13×10^{-2}
(E) 2.13×10^{-5}

29. If x and y are positive real numbers such that $\sqrt{x^5y^7} = \left(\frac{y}{x}\right)^{\frac{1}{2}}$, then $xy = ?$

(A) 0
(B) 1
(C) 2
(D) x
(E) y

30. If x is a positive real number such that $\left(\sqrt{x^{-\frac{4}{3}}}\right)^{\frac{5}{2}} = \frac{1}{32}$, then $x = ?$

(A) $-\frac{1}{32}$
(B) $\frac{1}{32}$
(C) $\frac{1}{8}$
(D) 2
(E) 8

31. If $3^x = 12^{-1} \cdot 18^{x-1}$, then $x = ?$

(A) -3
(B) -1
(C) 0
(D) 1
(E) 3

32. If $m^2 = 16$ and $n^3 = 27$, which of the following MUST be true?

(A) $mn = 12$
(B) $m + n = 7$
(C) $|mn| = 12$
(D) $m > n$
(E) $mn > 0$