1 Problem A

$f(x) = 0$

$(e^x - e^\pi)(e^x - \pi) = 0$

$e^x = e^\pi, e^x = \pi$

$x_1 = Ine^\pi + i(\arg e^\pi + 2k\pi) = \pi + 2k\pi i$

$x_2 = In\pi + i(\arg \pi + 2k\pi) = In\pi + 2k\pi i$

$(k \in Z)$

2 Problem B

$$n^4 - n^3 + n^2 - n = n(n^3 - n^2 + n - 1) = n[n^2(n-1) + (n-1)] = n(n-1)(n^2+1) \quad (1)$$

1° When n is an even number, $n$can be divisible by 2.

∴ (1) can also be divisible by 2.

2° When n is an odd number, $n - 1$is an even number.

∴ $n - 1$can be divisible by 2.

∴ (1) can also be divisible by 2.

∴ All positive integers n satisfy the condition.

3 Problem C

$\frac{4}{3}\pi r^3 = \pi^3$

$r^3 = \frac{3}{4}\pi^2$

$r = \sqrt[3]{\frac{3}{4}\pi^2} = \frac{\pi}{4}\sqrt[3]{\frac{48}{\pi}} \approx 1.9489$

∵ r is an irrational number.

∴ It is impossible to build such a sphere in reality.

4 Problem D

$\log_2(2^2 + 5 \cdot 2^2 \cdot 3) \cdot (2\log_3 2 + \log_3(7 - \frac{1}{4})) + \frac{(\log_2 128 - 2)^3}{3+2} + (-1)^{32+\pi^0}$

$= \log_2 64 \cdot (\log_3 4 + \log_3 \frac{27}{4}) + \frac{(7-2)^3}{5} + (-1)^{33}$

$= 6 \cdot \log_3 27 + 25 - 1$

$= 6 \cdot 3 + 24$

$= 42$

5 Problem E

$A(x,y) = (y+x) \cdot a \cdot \frac{1}{2} = \frac{a(x+y)}{2}$
$(0 \leq x \leq a, 0 \leq y \leq a)$