A :

For

$$f(x) = x + x^2 - x^3 \quad (x \geqslant 0)$$

$$f(x) = -3(x + \tfrac{1}{3})(x-1)$$

when $0 \leqslant x \leqslant 1$ then $f'(x) \geqslant 0$

else $1 < x$ $f'(x) < 0$

So, the function reaches its peak at $x = 1$

the maximum value of the function is $f(1) = 1$

B. According to the law of natural number distribution, there must be an even number in any three natural numbers.

So the whole integer can be expressed as "$2k-1$" and "$2k$"

examples:

$$\left(\begin{matrix} 2\times1-1 & 2\times1 & 2\times2-1 \\ 1 & 2 & 3 \end{matrix} \quad \cdots \right)$$

So, $n(n+1)(n+2)$ equals to

$$\left\{ \begin{matrix} (3k-2)(3k-1)(3k) \\ (3k-1)(3k)(3k+1) \\ (3k)(3k+1)(3k+2) \end{matrix} \right.$$

proves that it can be divided by 3.

C.

$$\sin\left(x + \frac{\pi^3 + 2\sqrt{\pi^6}}{\pi^2 + \pi^2} + \pi^{\pi^0}\right) = \cos\left(x + \frac{(-1)^{16}}{2} - \frac{\log_2 \sqrt{8}}{3}\right)$$

$$\Rightarrow \sin\left(x + \frac{3\pi^3}{2\pi^2} + \pi\right) = \cos\left(x + \frac{1}{2} - \frac{\frac{1}{2}\cdot 3}{3}\right)$$

$$\Rightarrow \sin\left(x + \frac{\pi}{2} + 2\pi\right) = \cos x$$

$$\Rightarrow \cos x = \cos x$$

Established for all real numbers

So the x can be 0.5 or π or other real numbers.

D.

$$\begin{cases} \alpha+\beta+\gamma=1 & ① \\ 2\beta+\gamma=1 & ② \Rightarrow \\ 2\gamma+\beta=1 & ③ \end{cases} \quad \begin{cases} ①-② = 0 \Rightarrow \alpha-\beta=0 \\ ②-③ = 0 \Rightarrow \beta-\gamma=0 \\ ①-③ = 0 \Rightarrow \alpha-\gamma=0 \end{cases}$$

So, $\alpha=\beta=\gamma$ $\quad \alpha=\frac{1}{3}$

E.

$\pi r^2 = m^2$ $\quad r=\frac{m}{\sqrt{\pi}}$ $\quad$ (r is the radius of the circle)

Let the side length of the square be d

$d \Rightarrow d=\sqrt{2}r^3$ $\quad A_2 = d^2 = \frac{2m^2}{\pi}$