12. [10 points] In the following sentences circle **all** that apply. There might be more than one correct choice for each part.

a. [3 points] The function $y = r(x)$ has a horizontal asymptote at $y = 0$. The formula of $r(x)$ could be:

$$\dfrac{x^{2018}}{e^{0.01x}} \qquad\qquad x^{-\frac{1}{2}} \qquad\qquad \text{NONE OF THESE}$$

$$\dfrac{x(x-2)(x+1)}{5x^3} \qquad\qquad (0.8)^x - 2$$

b. [3 points] The equation $\tan(\frac{x}{2} + \pi) = 5$ has solution:

$$\arctan(5) - \pi \qquad\qquad 2\arctan(5) - 2\pi \qquad\qquad \text{NONE OF THESE}$$

$$2\arctan(5) \qquad\qquad 2\arctan(5) + \pi$$

c. [2 points] Let $Q(x)$ be an **odd** function such that $\lim\limits_{x \to 5^-} Q(x) = -\infty$. Then $\lim\limits_{x \to -5^+} Q(x)$ is equal to:

$$-\infty \qquad 0 \qquad +\infty \qquad 5 \qquad \text{NONE OF THESE}$$

d. [2 points] Let $g(x)$ be a function that has domain $[0, \infty)$ and $f(x) = x^3 + x^2$. The domain of $g(f(x))$ is:

$$[0, \infty) \qquad [-1, \infty) \qquad \text{all real numbers} \qquad (-\infty, 1] \qquad \text{NONE OF THESE}$$