10. [10 points]

    a. [2 points] Which of the following functions dominates all the others as $x \to \infty$? **Circle exactly one of the options below.**

$$5 \left(\frac{2}{3} \right)^x \qquad e^{0.5x} \qquad (1.6)^{x-3} \qquad 8(1.6)^{-x} \qquad 10x^{100} \qquad 2^{x/2}$$

    b. [2 points] Which of the following functions dominates all the others as $x \to -\infty$? **Circle exactly one of the options below.**

$$5 \left(\frac{2}{3} \right)^x \qquad e^{0.5x} \qquad (1.6)^{x-3} \qquad 8(1.6)^{-x} \qquad 10x^{100} \qquad 2^{x/2}$$

    c. [2 points] Circle **all** intervals over which $(x-1)^{2016}(x-2)^{2017}(x-3)^{2018}$ is positive.

$$(-\infty, 1) \qquad (1, 2) \qquad (2, 3) \qquad (3, \infty) \qquad \text{NONE OF THESE}$$

    d. [2 points] Which of the following functions are periodic? Circle **all** correct options.

$$e^{\sin(x)} \qquad e^{0.1x} \sin(3x) \qquad \cos(x^2)$$

$$\sin^2(2x) + 3\cos^5(4x) \qquad \text{NONE OF THESE}$$

    e. [2 points] Which of the following expressions could be a formula for $f(x)$, given that $\lim\limits_{x \to \infty} f(x) = \infty$. Circle **all** correct options.

$$e^{0.01x^2 - x} \qquad x^6 + e^{-2x} \qquad x^6 e^{-2x}$$

$$\ln(x + 2017) - \ln(x + 2016) \qquad \text{NONE OF THESE}$$