2. [11 points] The following parts are unrelated.

a. [3 points] Which of the following limits are equal to 0? Circle all correct answers.

i. \( \lim_{x \to \infty} \frac{3x^2 - x + 5}{1 - x^2} \) 

ii. \( \lim_{x \to \infty} \frac{x^3}{1 - x^4} \)

iii. \( \lim_{x \to \infty} \frac{x^2}{e^{2x}} \)

iv. \( \lim_{x \to -\infty} \frac{x^2}{e^{2x}} \)

v. \( \lim_{h \to 0} \frac{\sin(h) - \sin(0)}{h} \)

vi. \( \lim_{h \to 0} \frac{\cos(h) - \cos(0)}{h} \)

vii. NONE OF THESE

b. [2 points] If \( k(x) \) is an odd function that is differentiable on \((-\infty, \infty)\), which of the following must be true? Circle all correct answers.

i. \( k'(x) \) is an odd function

ii. \( k(0) = 0 \)

iii. \( \int_{-2}^{2} k(x) \, dx = 0 \)

iv. \( \int_{-3}^{1} k(x) \, dx = \int_{-1}^{3} k(x) \, dx \)

v. NONE OF THESE

c. [2 points] Which of the following is a formula for the linear approximation to \( xe^{2x} \) at \( x = 1 \)? Circle the one correct answer.

i. \( 2e^2 x - e^2 \)

ii. \( e^2 + (2xe^{2x} + e^{2x})(x - 1) \)

iii. \( 3e^2 x + e^2 \)

iv. \( e^2 + e^2(x - 1) \)

v. NONE OF THESE

d. [4 points] A company’s maximum profit is earned when it produces \( q = 8 \) units of their product. If its marginal revenue function is \( MR(q) = 3 \), which of the following could be true? Circle all correct answers.

i. the company’s cost function is \( C(q) = \frac{q^2}{2} - 5q \), and they can produce at most 12 units of their product

ii. the company’s cost function is \( C(q) = 2q \), and they can produce at most 8 units of their product

iii. the company’s marginal cost function is \( MC(q) = 4 \), and they can produce at most 8 units of their product

iv. the company’s marginal cost function is \( MC(q) = \sqrt{q + 1} \), and they can produce at most 15 units of their product

v. NONE OF THESE