

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. $\lim_{x \rightarrow \infty} \frac{3x^2 - x + 5}{1 - x^2}$ iii. $\lim_{x \rightarrow \infty} \frac{x^2}{e^{2x}}$ v. $\lim_{h \rightarrow 0} \frac{\sin(h) - \sin(0)}{h}$

ii. $\lim_{x \rightarrow \infty} \frac{x^3}{1 - x^4}$ iv. $\lim_{x \rightarrow -\infty} \frac{x^2}{e^{2x}}$ vi. $\lim_{h \rightarrow 0} \frac{\cos(h) - \cos(0)}{h}$

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

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

ii. $k(0) = 0$

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. $2e^2x - e^2$

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

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

v. $3e^2x + e^2$

iii. $3e^2(x - 1) + e^2$

vi. 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