

2. [10 points] The parts of this problem are not related.

- a. [2 points] If $p(x)$ is a polynomial of degree 5 such that $\lim_{x \rightarrow \infty} p(x) = \infty$ and $\lim_{x \rightarrow -\infty} p(x) = -\infty$, which of the following are possible leading terms of $p(x)$?

Circle all correct options.

$5x^3$ $-5x^3$ $-\frac{1}{2}x^5$ $3x^5$ $-2x^5$ $\frac{3}{4}x^5$ None of these

- b. [2 points] If $q(x)$ is a polynomial such that $\lim_{x \rightarrow \infty} q(x) = -\infty$ and $\lim_{x \rightarrow -\infty} q(x) = \infty$, which of the following are possible degrees of $q(x)$?

Circle all correct options.

5 600 -1 755 2 None of these

- c. [2 points] Which of the following functions approach 0 as $x \rightarrow -\infty$?

Circle all correct options.

$\frac{x^2 + 8x^3}{x(6+x)(2x-1)}$ $\frac{e^x + 3}{x^2 + 1}$ $\frac{2^x + 5}{3^x + 7}$ $\frac{1}{\ln(-x)}$ None of these

- d. [2 points] Which of the following functions dominates all the others as $x \rightarrow \infty$?

Circle exactly **one** of the options.

$100x + 650$ $5e^x$ $2(3)^x$ $2(3)^{-x}$ $15x^4 + x + 6$ $75x^{500}$

- e. [2 points] If θ is an angle with $\cos(\theta) = a$ for some positive number a , which of the following values must also equal a ? Circle all correct options.

$\cos(-\theta)$ $\cos(\pi - \theta)$ $\cos(2\pi - \theta)$ $\cos(\pi + \theta)$ None of these