Math 1225 Homework 3 on Limits
Put all work on another sheet of paper and staple multiple sheets together.
Do Not use INK.

Use algebra to evaluate the following problems 1 – 5.

1) \( \lim_{{x \to \infty}} \frac{x + x^5}{2x^3 + 3x^3} \)
2) \( \lim_{{x \to \infty}} \frac{2x + x^4}{x^6 - x^4} \)
3) \( \lim_{{x \to -\infty}} \frac{x^6 + 4x}{2x^3 + x^4} \)
4) \( \lim_{{x \to -\infty}} \frac{3x - 4x^3}{2x^3 + x^2} \)

5) Use limits only to sketch \( f(x) \) and show all work.
\[
f(x) = \frac{3x + 4}{x - 7}
\]

6) Using the Intermediate Value Theorem, show how the IVT verifies that when
\( f(x) = x^3 - x^2 + x + 3 \), there exist a \( c \) in the interval \([0, 2]\) so that \( f(c) = 2e \).

7) Use the Intermediate Value Theorem, to verify that \( f(x) = x^2 - x^4 + x \) has a root over the interval \([1, 2]\).

8) Use the Intermediate Value Theorem to verify that there exist an \( x \) value on the interval \((1, 2)\) so that \( \sin(x) = x^2 - x \).