

Sheet 1

1. Use the Limit Comparison Test to prove that $f(n) = O(g(n))$, where:

- a. $f(n) = 3n^2 + 5n$ $g(n) = n^2$
 - b. $f(n) = 7\log(n) + 2$, $g(n) = \log(n)$
 - c. $f(n) = \frac{n^2+1}{n+1}$ $g(n) = n + 1$
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2. Use the Limit Comparison Test to prove that $f(n) = \Omega(g(n))$, where:

- a. $f(n) = 4n^3$ $g(n) = 3n^2 + 5n$
 - b. $f(n) = 7\log^2(n) + 2$ $g(n) = \log(n)$
 - c. $f(n) = n + 1$ $g(n) = \frac{n^2+1}{n+1}$
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3. Use the Limit Comparison Test to prove that $f(n) = \Theta(g(n))$, where:

- a. $f(n) = 10n^4 - 6n^3 + 2$ $g(n) = 3n^4$
- b. $f(n) = 5n\log(n) - 3n$ $g(n) = n\log(n)$
- c. $f(n) = 12n^2 + 8n\log(n) + 4$ $g(n) = n^2$