

## The JETS Challenge

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### Challenge 50 – The Variable Frequency Challenge

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**Problem:**

*A Variable Frequency Drive (VFD) is often used in buildings to power pumps and fans more efficiently. The efficiency ( $y$ , as a percentage up to 100%) is a function of  $x$ , the ratio of actual to nominal motor rotation. The correlation is*

$$y = 50.87 + 1.283x - 0.0142x^2 + 5.834 \times 10^{-5}x^3.$$

**Find the efficiency of a nominal 1750-rpm drive at an actual speed of 750 rpm.**

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**Solution:**

$$y = 50.87 + 1.283x - .0142x^2 + 5.834 \times 10^{-5} \times x^3$$

$$x = \frac{\text{actual}}{\text{nom.}} = \frac{750\text{rpm}}{1,750\text{rpm}} = .428571428571$$

$$y = 51.417\%$$