(1) Use symmetry to evaluate the integral $\int_{-2}^{2}(x^4 - xe^{-x^2})dx$.

(2) Find the average value of $f(x) = \sec^2 x$ on $[0, \pi/4]$.

(3) The elevation of a path is given by $f(x) = x^3 - 5x^2 + 30$ feet above sea level, where x measures horizontal distance in miles. Find the average value of the elevation function for $0 \le x \le 4$ and indicate it on the graph.
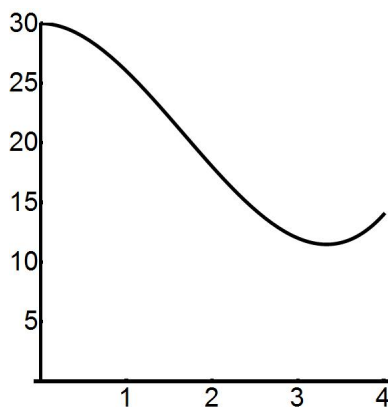
(4) In chapter 2 we saw that the **average rate of change** for a function f over an interval $[a, b]$ was given by $\frac{f(b)-f(a)}{b-a}$. In chapter 5 we've defined the **average value** of a function f over an interval $[a, b]$ to be $\frac{1}{b-a}\int_{a}^{b} f(x)dx$. To see that these different uses of the word "average" are actually closely related, use the Fundamental Theorem of Calculus (Part 2) to check that the **average value** of the **derivative** of f over an interval $[a, b]$ is the same as the **average rate of change** of f over the same interval (i.e., the average rate of change is the same as the average value of the rate of change).