1. (10 pts.) Calculate the following:
   
   (a) $\int x^2 \sqrt{4x^3 + 5} \, dx$

   (b) $\int_0^2 \frac{x}{(1 + x^2)^3} \, dx$

2. (10 pts.) Let $I = \int_0^1 f(x) \, dx$, where the function $f$ has the values shown in the table:

   \[
   \begin{array}{c|c|c|c|c|c}
   x & 0 & 0.25 & 0.50 & 0.75 & 1.00 \\
   f(x) & 1 & 1.2 & 1.6 & 2.4 & 3.6 \\
   \end{array}
   \]

   (a) Calculate $L_4$.

   (b) Suppose we know that $f(x)$ is increasing on the interval $[0, 1]$. How does $L_4$ compare to $I$? Illustrate with a picture.