1. Consider the function $f$ shown above. Next to it, sketch the graph of $A_f(x) = \int_1^x f(t) \, dt$.

2. Find $\int \frac{e^{1+\sqrt{x}}}{\sqrt{x}} \, dx$. Show your steps.

   - Let $u = 1+\sqrt{x} = 1+ x^{1/2}$. Then
   - $du = \frac{1}{2} x^{-1/2} \, dx = \frac{1}{2\sqrt{x}} \, dx$
   - So the integral becomes:
     $$2 \int \frac{e^{1+\sqrt{x}}}{2\sqrt{x}} \, dx = 2 \int e^u \, du = 2e^u + C$$

2. Bonus Suppose the lower and upper limits of this integral are 1 and 4. What are the corresponding limits on the new integral, after the substitution is made?

   - When $x=1$, $u = 1+\sqrt{1} = 1+1 = 2$
   - When $x=4$, $u = 1+\sqrt{4} = 1+2 = 3$

3. Consider $\int_0^1 10 + 0.4x^2 \, dx$

3A. Find the exact value.

   $$\int_0^1 10 + \frac{4}{10} x^2 \, dx = 10x + \frac{4}{10} \cdot \frac{1}{3} x^3 \bigg|_0^1 = 10x + \frac{4}{10} \bigg|_0^1 = (10 + \frac{4}{10}) - (0 + 0) = 10.1$$

3B. What are the areas of the two rectangles required to find RHS(2) for this integral?

   - Area of 1st: $\frac{1}{2} \cdot f(\frac{1}{2}) = \frac{1}{2} \cdot (10 + \frac{4}{10} \cdot (1/2)^2) = \frac{1}{2} \cdot (10 + \frac{4}{20}) = \frac{1}{2} \cdot 10.05 = 5.025$
   - Area of 2nd: $\frac{1}{2} \cdot f(1) = \frac{1}{2} \cdot (10 + 0.4 \cdot 1^2) = \frac{1}{2} \cdot 10.4 = 5.2$