READ ME FIRST: Show me all the magic very neatly on the page, for I do not read minds. Use correct notation when presenting your computations and arguments. Use complete sentences. Remember this: "=" denotes "equals" , "⇒" denotes "implies" , and "⇔" denotes "is equivalent to".   Since the answer consists of all the magic transformations, do not "box" your final results. Eschew obfuscation.

1. (4 pts.)   Find the exact arc length of the curve $y = x^{3/2}$ over the interval from $x = 1$ to $x = 4$.

2. (4 pts.)   A spring exerts a force of 5 N when stretched 1 m beyond its natural length. How much work is required to stretch the spring 1.8 m beyond its natural length?

3. (12 pts.)   Evaluate each of the following integrals.

(a) $\int \tan^{-1}(3x)\, dx =$

(b) $\int x \ln(x)\, dx =$

(c) $\int e^x \sin(x)\, dx =$