1. Find the following indefinite integrals (antiderivatives):
   a. $\int (\sqrt{x} - x^2) \, dx$
   b. $\int x^2 \sin(x^3) \, dx$
   c. $\int \frac{x^2}{\sqrt{x}} \, dx$

2. Find all the local minima and maxima (extrema) of the function $f(x) = x^2 \ln(x)$ and indicate on which intervals $f$ is increasing and on which intervals $f$ is decreasing.

3. Let $v(t) = t^2 - \sqrt{t}$ be the velocity of an object at time $t$. Compute the change of position in the object between times $t = 1$ and $t = 2$.

4. Find an equation of the line tangent to the curve
   
   $$y^2 + 4e^y = 4x + \ln(x^2)$$
   
   at the point $(1, 0)$.

5. Let $g(x) = \int_a^x \tan(x^2) \, dx$. What is $g''(x)$?

6. Let $f(x) = 2^x - 3\sin(x)$. Find $f'(x)$.

7. Where is the graph of $f(x) = e^{-x^2}$ concave down?

8. What is the area between the line $y = 0$ (the $x$-axis) and the parabola $y = 1 - (x - 1)^2$?

9. Find the derivative of $f(x) = x^x$. 