1. Find the derivative of each function. Assume all letters except for $x$ are constants.

(a) $f(x) = ax^3 + bx + c$
(b) $f(x) = xe^{ax}$
(c) $f(x) = ax + \sin(b^2x)$

2. Assume $a$ is a positive constant, and consider the family of functions $f(x) = (x^2 + ax)^2$. Draw a number line indicating where the derivative is positive and where the derivative is negative. Where is $f$ increasing and where is $f$ decreasing?

3. Assuming $a$, $b$, and $c$ are positive constants, find the location of all inflection points for the family of functions $f(x) = ax^3 - bx^2 + cx + d$. Where is $f$ concave up and where is $f$ concave down?

4. If $f(x) = x^2e^{-ax}$, where $a$ is a positive constant, then where is $f$ increasing and where is $f$ decreasing?