1. (8 points) The line tangent to the graph of a function $f$ at the point $(2, 5)$ on the graph also goes through the point $(0, 7)$. What is $f'(2)$?

2. (8 points) What is the slope of the line tangent to the graph of $f(x) = x - x^{-2}$ at the point $(2, 7/4)$?

3. (12 points) Let $f(x) = 1/(3x)$.
   (a) Find $f'(x)$.
   (b) Find $f'(2)$
   (c) Use the information found in (b) to find an equation for the line tangent to the graph of $f$ at the point $(2, 1/6)$.

4. (10 points) Find the rate of change of $f(t) = e^{2t} \cdot \ln(t)$ when $t = 1$. 
5. (10 points) A radioactive substance has a half-life of 27 years. Find an expression for the amount of the substance at time $t$ if 20 grams were present initially.

6. (10 points) If $h = g \circ f$ and $f(1) = 2, g'(2) = 5, f'(1) = -3$ find $h'(1)$.

7. (12 points) Let $f(x) = x^4 + 2x^3 - 6x^2 + x - 5$.

   (a) Find the interval(s) where $f$ is concave upward.

   (b) Find the inflection points of $f$, if there are any.
8. (12 points) Find the area of the region $R$ bounded above by the graph of 
$f(x) = -(x + 1)(x - 3)$, below by the $x$-axis, and on the sides by the vertical 
lines $x = 0$ and $x = 2$.

9. (12 points) Find the area of the region $R$ caught between the graph of 
$f(x) = x^2 - 3x + 2$ and $g(x) = -x + 5$.

10. (8 points) Evaluate $\int x^2 - \sqrt{x} \, dx$

11. (12 points) Evaluate $\int_1^3 x^3 \cdot (x^4 - 2)^2 \, dx$

12. (12 points) Evaluate $\int_0^4 2xe^{x^2} \, dx$