



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  $\int_0^4 2xe^{x^2} \, dx$