

Math Camp 2012
Homework 3

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible.

1. Solve the following anti-derivatives and check your answer afterwards, by taking the derivative (You may have to do integration by substitution or integration by parts).

(a) $\int x^3 \sqrt{x^4 + 5} \, dx$

(b) $\int \frac{1}{5-x} dx$

(c) $\int x^3 \ln(x) dx$

(d) $\int x^3 dx$

(e) $\int \frac{1}{t^2} dt$

(f) $\int \sqrt{t} dt$

(g) $\int e^y y^{-2} dy$

2. Solve the following definitive integral and evaluate (You may have to do integration by substitution or integration by parts).
(You can use your calculator to evaluate)

(a) $\int_0^{10} (3-x)^{10} dx$

(b) $\int_1^3 \frac{x^2+1}{x^3+3x} dx$

(c) $\int_0^1 \frac{\ln(x)}{x} dx$

(d) $\int_1^9 2y^5 dy$

(e) $\int_1^2 2x \ln(x) dx$

3. For the following function $f(x) = 4x^2 + 12x - 18$, find the interval where x is between $[-10, 10]$ and the function lies above 0. Do so by solving for the roots and knowing that the function is quadratic and opens up upwards. For both intervals where the function is above zero, calculate the area under the function by integration.