

You may keep this page of questions. Turn in your answers with all of your work on the colored paper. Each problem is worth 10 points.

I. (1) Write down the abstract partial fractions decomposition for

$$f(x) = \frac{x^6 - 4x^5 + 7x^3 - 15}{x^2(x+4)(x^2 - 6x + 13)(x^2 + 1)^3}.$$

II. Analyze and evaluate the following antiderivatives, definite integrals and improper integrals.

(2) $\int \sin^5 x \, dx.$

(3) $\int_0^{\infty} e^{-3x} \, dx.$

(4) $\int t^4 \tanh(t^5) \, dt$

(5) $\int_0^{\pi/2} x \cos x \, dx.$

(6) $\int \frac{\sqrt{x^2 - 9}}{x} \, dx.$

(7) $\int_0^2 (x - 2)^{-3/5} \, dx.$

(8) $\int \frac{x^2 + 6x - 12}{x^3 + 4x} \, dx.$

III. Turn in the above work on the gold paper and receive green paper to use for these last two questions. Use Mathcad to find the following antiderivatives.

(9) $\int x(x^2 + 4x + 29)^{\frac{5}{2}} \, dx$

(10) $\int x e^{4x} \cos(3x) \, dx$