

Calculus Group Work Handout: Antiderivative Practice

Easy: (Don't count on these showing up on the test!)

$$\int dx/(x^2 + 16); \int xe^{4x} dx; \int_{\pi/2}^{\pi} (\sin x - 1/\sqrt{x} - 1/x) dx; \int (2x + 1)^5 dx$$

$$\int \cos 4x \cos 7x dx; \text{ Write } 1/(x^2 + 2x - 3) \text{ in terms of partial fractions.}$$

Medium: $\int \sin^{17} x \cos^3 x dx; \int_0^{\sqrt{5}} \sqrt{5 - x^2} dx; \int (1/x^2) \sqrt{1 - 1/x} dx;$

$$\int ((x + 1)/(5x^2 + 3)) dx; \int x(\ln x)^2 dx; \text{ Write } 1/((x^2 + 1)(x - 1)) \text{ as partial fractions.}$$

Harder: $\int ((x^3)/(\sqrt{2x^2 - 1})) dx; \int dx/(x^2 - 2x + 7); \int \sin^2 3x \cos^2 3x dx;$

$$\int e^{-2x} \cos 6x dx; \int_{-\pi}^{\pi} x^9 \cos 4x dx; \int dx/((x^2 + 2x + 1)(x^2 + 2x + 3))$$

Difficult: (If you can do these, you can do just about anything!)

$$\int x \cos^2 x dx; \int ((e^{2x})/(e^x + \sqrt{(e^x)^2 + 4})) dx; \int ((3x - 4)/(2x^2 + x + 6)) dx;$$

$$\int_0^4 \sqrt{4 - (x - 2)^2} dx; \int \cos^3 x \sqrt{\sin x} dx; \int (x^5/(x^4 - 9)) dx$$

Impossible: (For those who think they can integrate anything, here are some that are impossible to do!)

$$\int dx/(x^5 - 4x + 2); \int e^{x^2} dx; \int e^x \ln x dx;$$

$$\int \sin(x^2) dx; \text{ (This one has a name: a Fresnel integral.)}$$

$$\int dx/\sqrt{1 - x^3} \text{ (This has a name too: an elliptic integral)}$$