Math 118 Winter 2015 Homework 4

Due Thursday Feb. 5 3pm in Assignment Box

QUESTION 1. (5 PTS) *Calculate the following integrals.*

a) (2 PTS) $\int \dfrac{\sin 2x}{1+\cos^2 x}\, \mathrm{d}x.$

b) (3 PTS) $\int \dfrac{\cos x}{\sin x + 2\cos x}\, \mathrm{d}x.$

QUESTION 2. (5 PTS) *Calculate the following integrals.*

a) (2 PTS) $\int \dfrac{x\,\mathrm{d}x}{\sqrt{1+\sqrt[3]{x^2}}}.$

b) (3 PTS) $\int \dfrac{\mathrm{d}x}{\sqrt[3]{(x+1)^2\,(x-1)^4}}.$

QUESTION 3. (5 PTS) *Consider* $F_k(x) := \int \sqrt[3]{x^k + x^{-k}}\, \mathrm{d}x$ *for* $k = 1, 2, 3$. *Apply Chebyshev's Theorem (Lecture 12) to determine which* $F_k(x)$ *is elementary and calculate these elementary ones.*

QUESTION 4. (5 PTS) *Apply the results in Lecture 13 to prove that* $\int x \exp(x^3)\, \mathrm{d}x$ *is not elementary.*