For questions: at52@rice.edu due April 24, 11am

# HOMEWORK 11

**1.** Compute the following definite integrals

(a) $\int_0^4 \frac{3x}{\sqrt{1+6x^2}}\,dx$

(b) $\int_0^{\frac{\pi}{4}} e^{\cos^2(x)}\sin(x)\cos(x)\,dx$

**2.** Compute the antiderivative of the following functions:

i) $f(x) = \frac{3e^x}{1+e^{2x}}$
ii) $f(x) = x^3(8+x^4)^{\frac{5}{3}}$
iii) $f(x) = \frac{x}{\sqrt{(x^2+5)^3}}$
iv) $f(x) = \frac{1}{x\ln(x)^{\frac{2}{3}}}$
v) $f(x) = \tan(x)$
vi) $f(x) = \frac{1}{\cos(x)\sin(x)}$
vii) $f(x) = \frac{x}{\cos^2(3x^2+5)}$
viii) $f(x) = \frac{2}{\sqrt{1-x}+1}$
ix) $f(x) = \frac{x^5-x^3}{\sqrt{x^2-1}}$
x) $f(x) = \frac{x^3}{\sqrt{9-x^2}}$

**3.** Find the critical points of the function

$$f(x) = \int_0^{\cos(x)} e^{t^2}\,dt\ .$$

**4.** Find the area between the graphs of the functions $f(x) = x^2 + 9$ and $g(x) = 12 + 2x$.

**5.** Write an integral formula that computes the area of the region bounded by the curves $x = \sqrt{4-y^2}$ and $y^2 = 1 + x^2$ and the line $x = 0$.

**6.** Let $R$ be the region bounded by the $x$- and $y$-axis, by the curve $y = e^x + 1$ and by the line $x = 1$. Find the volume of the solid obtained by rotating $R$ around the $x$-axis.