Math 141 **Session 3** **Date: February 2019** **Omid Aghababaei**

Problem 1. Evaluate the following indefinite integrals using the Substitution Rule.

a. $\int (x+1)\sqrt{2x+x^2}dx$

b. $\int \frac{e^u}{(1+e^u)^2}du$

c. $\int \frac{\sin(2x)}{1+\cos^2(x)}dx$

d. $\int \frac{1+x}{1+x^2}dx$

Problem 2. Evaluate the following indefinite integrals by using the Substitution Rule.

a. $\int x^3\left(2+x^4\right)^5 dx$

b. $\int (3t+2)^{2.4}dt$

c. $\int \frac{\sec^2\left(1/x\right)}{x^2}dx$

d. $\int \frac{a+bx^2}{\sqrt{3ax+bx^3}}dx$

e. $\int \frac{e^u}{(1+e^u)^2}du$

f. $\int \frac{\sin^{-1}(x)}{\sqrt{1-x^2}}dx$

Problem 3. Evaluate $\int_0^1 x\sqrt{1-x^4}dx$ by making a substitution and interpreting the resulting integral in terms of an area.

Problem 4. Use the midpoint rule with the given value of n to approximate the following integrals. If f is continuous on $[0,\pi]$, use the substitution $u=\pi-x$ to show.

$$\int_0^{\pi} xf(\sin x)\,dx = \frac{\pi}{2}\int_0^{\pi} f(\sin x)\,dx$$