Topic #24: (Math 31)

1. Goals (Section 5.5)
    a. Substitution method of integration
2. Substitution:
    a. A method to find the indefinite integral of more complicated functions by ….
    b. Converting an integral in one variable to one in another variable.
3. Substitution method [Do simultaneously for example $\int 2x\sqrt{x^2+4}\ dx$
    a. Choose u = g(x).
    b. Find $\frac{du}{dx}$
    c. Solve for dx
    d. Replace dx.
    e. Replace other x-expressions by u-expressions
    f. Cancel out x's so only u's remain.
    g. Integrate new function of u.
    h. Replace u by g(x)
4. More examples [Give the u in the first few]
    a. $\int x^2\ (x^3-5)^{10}\ dx$
    b. $\int_0^{\sqrt{\pi}} x\cos x^2\ dx$
    c. $\int_0^7 \sqrt{4+3x}\ dx$
5. Typical choices of u
    a. Expression inside a power
    b. Expression inside square root
    c. Expression inside sin or cos
6. Point on definite integrals:
    a. Can convert back to x, then use original limits of integration, OR
    b. Leave as new variable, and change limits of integration according to substitution function.
    c. Example: Do one of above.
7. Examples.
    a. Section 5.5: 261 – 270 (indefinite with u given)
    b. Section 5.5: 271 – 287 (indefinite integrals)
    c. Section 292: 292 – 297 (definite integrals – do 2 ways)