Math 2423 homework

37. (11/7) 7.8 # 7, 8, 25, 26, 37, 42, 43, 47-50, 53-56, 81, 87, 97.

38. (11/7) 8.1 # 5, 7, 10, 15, 26, 31, 33, 38

39. (11/11) 8.1 # 48, 49 (integration by parts not needed), 50 ($u = \sec^{(n-2)}(x)$)

40. (11/11) 8.2 # 9, 12, 17, 25, 39, 41 (derive the formula by multiplying by $\dfrac{\csc(x)+\cot(x)}{\csc(x)+\cot(x)}$), 46, 64.

41. (11/11) Graph the functions $\sec(x)+\tan(x)$, $|\sec(x)+\tan(x)|$, and $\ln(|\sec(x)+\tan(x)|)$. (Hint: $\sec(x)+\tan(x) = \dfrac{1+\sin(x)}{\cos(x)}$, what is $\lim\limits_{x\to-\pi/2} \dfrac{1+\sin(x)}{\cos(x)}$?)

42. (11/21) 8.2 # 44, 45, 48, 68, 70

43. (11/21) For the following, do them using an inverse trig substitution, but also do them a second way if there is a relatively easy alternative: 8.3 # 5, 8, 20, 27, 29, 32, 39, 42

44. (12/2) As many as needed from 8.4 # 1-50. Hand in 8.4 # 4, 6 (to factor $x^6 - x^3 = x^3(x^3-1)$, observe that 1 is a root of x^3-1, and divide x^3-1 by $x-1$ to find the other factor), 21, 22, 27, 31, 34. Hand in 8.4 # 40, 45-50, but for them, do only the substitution and transformation of the integral into the integral of a rational function, do not go on to calculate the integral.

45. (12/2) 8.4 # 27, 58, 59 (for 58 and 59, transform the integral into the integral of a rational function of t, but do not continue on to evaluate the integral)

46. Spend 45 minutes or an hour of distraction-free time working on the problems in Section 8.5. Try to do random problems that use different techniques. Just do each one far enough to get to the point where you are sure that you could finish it by taking enough time. For example, on #12, substituting $u = x^3+1$, $du/3 = x^2dx$ would reduce it to integrating $\operatorname{csch}(u)$, which would be solvable, so just move on. Or on #15, use the substitution $u = e^x$, $du = e^x dx$ to write the integral as $\int u \arctan(u)\, du$. Integrating by parts would change this to integrating a rational function of u, which we know we could do by partial fractions given enough (computer) time. For #25, substituting $u = \ln(x)$, $du = \frac{1}{u}\, du$ changes it to $\int \sqrt{4+u^2}\, du$, which is in the tables or alternatively we can regard as solvable by the standard inverse substitution $x = 2\tan(\theta)$. For #77, substitute $x = u^2$, $dx = 2u\, du$ to rewrite it as $\int \frac{2u^2}{1+u^6}\, du$, an integral of a rational function. Do some of the high-numbered (i. e. harder) problems if you can.