Math 2423 homework

27. (10/12) Let $f(x) = \sin(x)$, $-\pi/2 \leq x \leq \pi/2$.

(a) Find the domain and range of f.

(b) Check that f is injective.

(c) Writing $\sin^{-1}(x)$ for the inverse of f, use the graph of $f(x)$ to find the graph of $y = \sin^{-1}(x)$.

(d) Label the sides of a right triangle with hypotenuse of length 1 and one angle $\sin^{-1}(x)$. Use it to find $\cos(\sin^{-1}(x))$ and $\tan(\sin^{-1}(x))$.

(e) Calculate that the derivative of $\sin^{-1}(x)$ is $\dfrac{1}{\sqrt{1-x^2}}$.

28. (10/12) As many as needed from 7.2* # 1-12, 15-36 (when calculating derivatives, use properties of $\ln(x)$, when possible, to simplify before calculting the derivative, for example, the function in # 26 is $\frac{1}{2}\ln(a^2 - z^2) - \frac{1}{2}\ln(a^2 + z^2)$). Hand in 7.2* # 19, 20, 22, 33, 34, 47, 49 (your formula will involve $n!$, n factorial), 76, 83

29. (10/24 but do them before Exam II) 7.2* # 37, 40, 47, 48, 59, 61, 65, 66, 69.

30. (10/24) As many as needed from 7.3* # 2-12, 15-58, 75-84. Hand in 7.3* # 3, 8, 11, 12, 16-22, 29, 31, 32, 39, 47, 51, 54, 55, 76, 78, 83, 84, 89, 92

31. (10/24) As many as needed from 7.4* # 1-10, 17-18, 21-52. Hand in 7.4* # 6, 8, 10, 17, 18, 28, 29, 33, 40-42, 47, 50

32. (10/24) As many as needed of 7.6 # 1-10, 22-40, 59-70. Hand in 7.6 # 5, 6, 9, 10, 24, 28, 38, 59, 65, 68

33. (10/31) 7.6 # 47, 48, 50, Chapter 7 Review Problems # 112, 113

34. (10/31) As many as needed from 7.7 # 1-21, 23, 30-41, 53, 56-62. Hand in 7.7 # 11, 20 (find a hyperbolic trig identity similar to $\tan^2(x) + 1 = \sec^2(x)$), 36, 39, 41, 57-62.

35. (11/7) Obtain the formula $\cosh^{-1}(x) = \ln(x + \sqrt{x^2-1})$. In solving $x = \cosh(y)$ for x, there is a subtle step where you must rule out the possibility that $e^y = x - \sqrt{x^2-1}$, which might look possible since the right-hand side is positive. To rule it out, note that you have $y \geq 0$ (since that is the range of $\cosh^{-1}(x)$), so $e^y \geq 1$, but $x - \sqrt{x^2-1} < 1$ $\left(\text{multiply it by } \dfrac{x+\sqrt{x^2-1}}{x+\sqrt{x^2-1}}\right)$.

36. (11/7) 7.7 # 44, 45, 63-65.