Math 2423 homework

25. (3/27) 7.1 #26, 29, 30

26. (3/27) Following the program we used to develop $\tan^{-1}(x)$, construct the inverse sine function and establish its basic properies. Specifically,

   1. Let f be the function with domain the interval $[-\frac{\pi}{2}, \frac{\pi}{2}]$, defined by $f(x) = \sin(x)$. Find the range of f, and verify that f is injective.
   2. Sketch the graph of f, and of its inverse function, which is called the inverse sine function and denoted by $\sin^{-1}(x)$.
   3. For which x is $\sin(\sin^{-1}(x)) = x$?
   4. For which x is $\sin^{-1}(\sin(x)) = x$?
   5. Draw a right triangle whose sides are 1, x, and $\sqrt{1 - x^2}$, and label which angle is $\sin^{-1}(x)$. Use the triangle to find expressions for $\cos(\sin^{-1}(x))$ and $\tan(\sin^{-1}(x))$.
   6. Use the identity $\sin(\sin^{-1}(x)) = x$, the chain rule, and the expression for $\cos(\sin^{-1}(x))$ to obtain the formula $\dfrac{d}{dx}\left(\sin^{-1}(x)\right) = \dfrac{1}{\sqrt{1 - x^2}}$. Write this formula as an integration formula.

27. (3/27) 7.2* as many as needed of # 1-8, 13-38, 55-68

28. (3/27) 7.2* # 9-12, 17-20, 28-32, 35, 36, 43-46, 56, 57, 62, 64, 66-68, 71, 72, 82, 83

29. (3/27) 7.3* as many as needed of # 1-12, including at least 4, 8-12; all of # 18-30; as many as needed of # 31-44; all of # 46-49, 59-62, 69-76, 79, 80

30. (3/27) 7.4* # 3-10, 21, 22, as many as needed of # 23-38; all of # 41-46

31. (3/27) 7.5 as many as needed of # 1-10, including at least 8-10; as many as needed of # 22-40 excluding # 28 and 33, including at least 30, 34, 35, 38-40; # 48, 50; as many as needed of 59-70 including at least 63, 68-70; # 73, 77

32. (4/12) 7.6 # 3, 6, 10, 12-17, 20; as many as needed of 30-45, including at least 35, 44, 45; 51-63

33. (4/12) 7.7 # as many as needed from 1-62, including at least 3, 4, 8, 13, 19, 24, 30, 45-48, 56, 59, 60

34. (4/12) 7.7 # 81, 85, 86

35. (4/12) 8.1 as many as needed from # 3-36, including at least 8-13, 17, 18, 24-29

36. (4/12) 8.1 # 42, 46, 50, 57-59

37. (4/24) 8.2 as many as needed from # 1-47, including at least 9, 11-13, 19, 35, 36, 41, 60, 61, 66, 68