

MTH 162 Homework 4

Do the first six problems. Due: Feb 12, 2014 (Wednesday). Hand in to me during the class.

Compulsory:

Ex 5.5

20. (a) How long will it take an investment to double in value if the interest rate is 6% compounded continuously?
(b) What is the equivalent annual interest rate?

(Hints: (a) The time needed is independent of the initial amount. You may let the initial amount be A_0 . For both parts, give the exact answers first and then find the approximate values by using a calculator.)

Ex 5.6

1–6 ■ Find the exact value of each expression. (Can you do it **without a calculator** or **looking up the table**? If you have difficulties, read Appendix A of the book.)

1. (a) $\sin^{-1}(\sqrt{3}/2)$ (b) $\cos^{-1}(-1)$
2. (a) $\tan^{-1}(1/\sqrt{3})$ (b) $\sec^{-1} 2$
3. (a) $\arctan 1$ (b) $\sin^{-1}(1/\sqrt{2})$ (arctan is the same as \tan^{-1})

16–29 ■ Find the derivative of the function. Simplify where possible.

16. $y = \tan^{-1}(x^2)$

19. $y = \sin^{-1}(2x + 1)$

Recommended: (These types of questions may also appear in the exams)

Ex 5.4

1–6 ■ Find the exact value of each expression.

4. (a) $\cot^{-1}(-\sqrt{3})$ (b) $\arccos(-\frac{1}{2})$

5. (a) $\tan(\arctan 10)$ (b) $\sin^{-1}(\sin(7\pi/3))$

6. (a) $\tan(\sec^{-1} 4)$ (b) $\sin(2 \sin^{-1}(\frac{3}{5}))$

16–29 ■ Find the derivative of the function. Simplify where possible.

16. $y = \tan^{-1}(x^2)$

17. $y = (\tan^{-1}x)^2$

18. $g(x) = \sqrt{x^2 - 1} \sec^{-1}x$

19. $y = \sin^{-1}(2x + 1)$

20. $y = \tan^{-1}(x - \sqrt{1 + x^2})$

21. $G(x) = \sqrt{1 - x^2} \arccos x$

22. $F(\theta) = \arcsin \sqrt{\sin \theta}$

23. $h(t) = \cot^{-1}(t) + \cot^{-1}(1/t)$

24. $y = \cos^{-1}(\sin^{-1}t)$

25. $y = \arctan(\cos \theta)$

26. $f(x) = x \ln(\arctan x)$

27. $y = x \sin^{-1}x + \sqrt{1 - x^2}$

28. $y = \arctan \sqrt{\frac{1 - x}{1 + x}}$

29. $y = \arccos\left(\frac{b + a \cos x}{a + b \cos x}\right), \quad 0 \leq x \leq \pi, \quad a > b > 0$

Challenging: (Harder problems. Attempt if you are interested.)

Ex 5.4

8–10 ■ Simplify the expression.

8. $\tan(\sin^{-1}x)$

9. $\sin(\tan^{-1}x)$

10. $\cos(2 \tan^{-1}x)$

12. (a) Prove that $\sin^{-1}x + \cos^{-1}x = \pi/2$.

(b) Use part (a) to prove Formula 6.