MTH 162 Homework 2

Do the first four problems. Due: Jan 29, 2014 (Wednesday). Hand in to me during the class.

Compulsory:

Ex 5.2

15–32 ▪ Differentiate the function.

25. $g(x) = \ln\left(x\sqrt{x^2 - 1}\right)$

29. $y = \ln\left|2 - x - 5x^2\right|$

51–54 ▪ Use logarithmic differentiation to find the derivative of the function.

53. $y = \sqrt{\dfrac{x - 1}{x^4 + 1}}$

55–62 ▪ Evaluate the integral.

57. $\displaystyle\int_1^e \frac{x^2 + x + 1}{x}\,dx$ (e is the number defined by ln e = 1.)

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

Ex 5.2

15–32 ▪ Differentiate the function.

15. $f(x) = \sqrt{x}\,\ln x$

16. $f(x) = x\ln x - x$

17. $f(x) = \sin(\ln x)$

18. $f(x) = \ln(\sin^2 x)$

19. $f(x) = \ln\dfrac{1}{x}$

20. $y = \dfrac{1}{\ln x}$

21. $g(x) = \ln\dfrac{a-x}{a+x}$

22. $h(x) = \ln\left(x + \sqrt{x^2-1}\right)$

23. $G(y) = \ln\dfrac{(2y+1)^5}{\sqrt{y^2+1}}$

24. $f(u) = \dfrac{u}{1+\ln u}$

26. $H(z) = \ln\sqrt{\dfrac{a^2-z^2}{a^2+z^2}}$

27. $f(u) = \dfrac{\ln u}{1+\ln(2u)}$

28. $y = (\ln\tan x)^2$

31. $y = \tan[\ln(ax+b)]$

32. $y = \ln|\cos(\ln x)|$

33–34 ▪ Find y' and y''.

33. $y = x^2\ln(2x)$

34. $y = \ln(\sec x + \tan x)$

38. If $f(x) = \dfrac{\ln x}{x}$, find $f''(e)$.

42. Find y' if $\ln xy = y\sin x$.

51–54 ▪ Use logarithmic differentiation to find the derivative of the function.

51. $y = (x^2+2)^2(x^4+4)^4$

52. $y = \dfrac{(x+1)^4(x-5)^3}{(x-3)^8}$ **54.** $y = \dfrac{(x^3+1)^4 \sin^2 x}{x^{1/3}}$

55–62 ▪ Evaluate the integral.

55. $\displaystyle\int_1^2 \frac{dt}{8-3t}$ **56.** $\displaystyle\int_0^3 \frac{dx}{5x+1}$

58. $\displaystyle\int_4^9 \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 dx$

59. $\displaystyle\int \frac{(\ln x)^2}{x}\,dx$ **60.** $\displaystyle\int_e^6 \frac{dx}{x \ln x}$

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

Ex 5.2

43. Find a formula for $f^{(n)}(x)$ if $f(x) = \ln(x-1)$.

44. Find $\dfrac{d^9}{dx^9}(x^8 \ln x)$.