MATH111-002 200530 Practice Midterm 2

Edward Doolittle

October 26, 2005

You do not need to hand in your solutions to these problems!

1. (8 marks) Solve the following equations for x to four decimal places:

   (a) $\ln(e^x - 2) = 3$

   (b) $\cos(\tan^{-1}(\sin(\cot^{-1} x))) = \dfrac{1}{\sqrt{2}}$

2. (8 marks) Calculate derivatives of the following functions. Simplify where possible.

   (a) $f(x) = \log_{10} \dfrac{x}{x-1}$

   (b) $g(t) = \tan^{-1}(t) + \tan^{-1}(1/t)$

3. (4 marks) Use logarithmic differentiation to find the derivative of $y = (\ln x)^{\cos x}$.

4. (8 marks) Evaluate the integrals:

   (a) $\displaystyle\int \frac{dx}{x \ln x}$

   (b) $\displaystyle\int_0^1 \frac{4}{t^2+1}\, dt$

5. (8 marks) Find the limits

   (a) $\displaystyle\lim_{x \to 1} \frac{\ln x}{\sin \pi x}$

   (b) $\displaystyle\lim_{x \to 0^+} x^{x^2}$

6. (5 marks) Find the equation of the tangent line to the curve $y = (2+x)e^{-x}$ at the point $(0, 2)$.

7. (5 marks) Evaluate $\displaystyle\int \frac{\sec\theta \tan\theta}{1 + \sec\theta}\, d\theta$.

8. (4 marks) Find $\dfrac{d}{dx} \displaystyle\int_1^{\sqrt{x}} \frac{e^s}{s}\, ds$.

Please do the following problems from the textbook. You do not need to hand in your solutions to these problems! The problems on Midterm Test 2 will be closely related to, and in most cases identical to, problems on this list. You should have seen most of these problems before if you have been keeping up with the homework.

7.3 C-level: 3–8, 9–12, 13–18, 20–22, 29–38, 47–49; B-level: 39–44, 51–71, 75

7.4 C-level: 2–36, 39–54, 57–62 (do only one graph), 65–76; B-level: 77, 81, 83–85; A-level: 87–88

7.5 C-level: 1–8, 12–13, 22–33, 38–48, 51–54 (just do one or two), 59–70; B-level: 9–11, 14, 17–21, 34–37, 43–46, 48–50, 57–58; A-level: 74–80

7.7 C-level: 1–38, 67–72 (just do one or two; L'Hôpital's rule helps find asymptotes); B-level: 39–62, 73–75, 78–80, 83, 87–89; A-level: 81–82, 84–86, 93

7.R C-level: 5–36, 38–42, 44, 47, 49–52, 56–59, 61, 63–66, 69–78, 79–84 (just do one graph), 90–101, 103, 112; B-level: 48, 53–54, 62, 68, 87–89, 109–110, 113–117; A-level: 104–108, 118–120