

MATH 110 Problem Set 1.8

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The following problems based on Section 1.8 of the textbook will help you study. *You do not need to hand in solutions to these problems.*

1. (Based on 1.8.25–32) Find the domain of the following, and explain why each is continuous on its domain.

(a) $G(x) = \sqrt[3]{x}(1+x^2)$ (b) $(\sin x)/(x+1)$ (c) $\sin(\cos(\sin x))$

2. (Based on 1.8.22,42) For each of the following functions, find any discontinuities of the function and identify the type of any discontinuities found.

(a) $f(x) = \begin{cases} \frac{2x^2 - 5x - 3}{x - 3} & \text{if } x \neq 3 \\ 6 & \text{if } x = 3 \end{cases}$ (b) $g(x) = \begin{cases} x + 1 & -\infty < x \leq 1 \\ 1/x & 1 < x < 3 \\ \sqrt{x-3} & 3 \leq x < \infty \end{cases}$

3. (Based on 1.8.53–56) Use the Intermediate Value Theorem to show that there is a solution of the given equation on the given intervals I , and find a solution to one decimal point of accuracy.

(a) $\sqrt[3]{x} = 1 - x, I = (0, 1)$ (b) $\tan x = 2x, I = (0, 1.4)$ (c) $x^5 + 2x + 3 = x^2, I = (-\infty, \infty)$

4. (Based on 1.8.45–46) Find the values of a and b which make the following function continuous everywhere.

$$f(x) = \begin{cases} (x^2 - 4)/(x - 2), & -\infty < x < 2 \\ ax^2 - bx + 3, & 2 \leq x < 3 \\ 2x - a + b, & 3 \leq x < \infty \end{cases}$$

You may find the following additional exercises from Section 1.8 helpful.

- 1.8 C-level: 1–2, 3–4, 5–6, 7–8, 9–10, 11–14, 15–16, 17–20, 22, 23–24, 35–38, 39–40, 41–43, 49, 53–56;
B-level: 21, 19, 25–32, 33–34, 44–45, 47, 48, 50–52, 57–58, 59–60, 61–62;
A-level: 46, 63–73