MATH 1041 **Review Problems for Test 1** **Fall 2023**

1. Text: James Stewart, *Calculus, Early Transcendentals*, **8th** Edition, Cengage Learning

2. *Supplementary Exercises* (**SE**)

Chapter 2: Limits and Derivatives

2.2: Problem 4:

(a) 3

(b) 1

(c) d.n.e. since by (a) and (b), the left and right limtis at 2 are unequal

(d) 4

(e) undefined; no value given for function

Problem 8:

(a) a ∞

(b) $-\infty$

(c) ∞

(d) $-\infty$

(e) $x = -3$, $x = -1$, and $x = 2$

Problem 32: $-\infty$

2.3: Problem 2:

- (c) 2
- (d) d.n.e. since $\lim_{x\to 3^-}\left(\frac{f(x)}{g(x)}\right) = \infty$ but $\lim_{x\to 3^+}\left(\frac{f(x)}{g(x)}\right) = -\infty$
- (e) -4

Problem 6: 4 Problem 12: $\frac{3}{7}$ Problem 24: $\frac{-1}{9}$
Problem 26: 1 Problem 38: 2
Problem 42: d.n.e. since $\lim_{x\to -6^-}\dfrac{2x+12}{|x+6|} = -2$ but $\lim_{x\to -6^+}\dfrac{2x+12}{|x+6|} = 2$

2.5: Problem 36: 0

Problem 56: Put $f(x) = \sin(x) + x - x^2$. Now, $f(1) = \sin(1) + 1 - 1 = \sin(1) > 0$, but $f(2) = \sin(2) + 2 - 4 = \sin(2) - 2 < 0$. Since $f(2) < 0 < f(1)$ and f is continuous on $[1, 2]$, we conclude, by IVT that there is some c in $(1, 2)$ for which $f(c) = 0$. This c is a solution to our original equation.

2.6: Problem 18: 2 Problem 22: 1 Problem 24: 2

Problem 36: 1

Problem 52: Horizontal asymptotes are $y = 0$ and $y = 2$; vertical asymptote is $y = \ln(5)$

2.7: Problem 16

(a) (i) 0 feet per second
(ii) 1 foot per second
(iii) 3 feet per second
(iv) 4 feet per second

(b) 2 feet per second

Problem 38: $f(x) = e^x$, and $a = -2$. The limit is equal to e^{-2}.

Problem 40: $f(x) = \dfrac{1}{x}$, and $a = \dfrac{1}{4}$ The limit is equal to $\dfrac{-1}{16}$.

2.8: Problem 24: $f'(x) = 8 - 10x$, domain of both f and f' is $(-\infty, \infty)$

Problem 26: $g'(t) = \dfrac{-1}{2\sqrt{t^3}}$, domain of both g and g' is $(0, \infty)$

Problem 42: The function is not differentiable at $x = -1$ due to a discontinuity, and at $x = 2$, due to a corner.

Chapter 3: Differentiation Rules

3.1: Problem 4: $f'(x) = 0$ Problem 14: $f'(x) = \dfrac{5}{3}x^{-2/3} - \dfrac{2}{3}x^{-1/3}$

Problem 16: $h'(t) = \dfrac{1}{4}t^{-3/4} - 4e^t$ Problem 34: $y - 2 = 3(x - 0)$

Problem 50:

(a) $v(t) = 4t^3 - 6t^2 + 2t - 1$ m/sec, and $a(t) = 12t^2 - 12t + 2$ (m/sec)/sec

(b) $a(1) = 2$ (m/sec)/sec

Problem 56: $x = \ln(2)$

3.2: Problem 4: $g'(x) = \left(x + 2\sqrt{x} + 1 + \dfrac{1}{\sqrt{x}}\right)e^x$

Problem 32: $y - \dfrac{1}{2} = \dfrac{1}{4}(x - 0)$

Problem 54: $y = \dfrac{1}{2}(x - 1)$ and $y - 2 = \dfrac{1}{2}(x + 3)$

MCC Review Workshop:

Thursday, 28 Sept. 5:00pm - 6:30pm, Gladfelter L021

SSC Review Workshop:

Friday, 29 Sept. 4:30pm - 6:00pm, Charles Library 340