

MATH 118: Quiz 4

Name: key

Directions:

- * Show your thought process (commonly said as "show your work") when solving each problem for full credit.
- * If you do not know how to solve a problem, try your best and/or explain in English what you would do.
- * Good luck!

1. Find the average rate of change of the function

$$f(x) = x^2 - x$$

on the interval $(x, x+h)$.

Recall that the average rate of change of $f(x)$ on the interval (a, b) is defined as

$$ARoC = \frac{f(b) - f(a)}{b - a}$$

For $(\overset{a}{\downarrow}x, \overset{b}{\downarrow}x+h)$, ARoC is

$$\frac{f(\overset{b}{b}) - f(\overset{a}{a})}{b - a} = \frac{f(x+h) - f(x)}{x+h - x}$$

$$= \frac{\overset{(A+B)^2}{(x+h)^2} - (x+h) - (x^2 - x)}{h}$$

$$= \frac{x^2 + 2xh + h^2 - x - h - x^2 + x}{h}$$

$$= \frac{2xh + h^2 - h}{h} \overset{GCF}{=} \frac{\cancel{h}(2x + h - 1)}{\cancel{h}} \overset{law 5}{=} \boxed{2x + h - 1}$$

2. Draw the graph of a function which has the following:

(a) $f(0) = 3 \longrightarrow (0, 3)$ on graph

(b) Local maxima at $x = 0$

(c) Increasing on $(-\infty, 0) \cup (2, \infty)$

(d) Decreasing on $(0, 2)$

(e) $f(2) = -3 \longrightarrow (2, -3)$ on graph

