MHF-4U **QUIZ#7** (Knowledge & Understanding) [redacted] 97%

28/29

1. Determine the roots algebraically by **factoring**. (Solve for x). Show work.

(5)

$2x^4 - 75x = 50x^2 - 3x^3$

$0 = 2x^4 + 3x^3 - 50x^2 - 75x$

$0 = x^3(2x+3) - 25x(2x+3)$

$0 = (x^3 - 25x)(2x+3)$

$0 = x(x^2 - 25)(2x+3)$

$0 = x(x-5)(x+5)(2x+3)$

$x = 0 \quad x-5=0 \quad x+5=0 \quad 2x+3=0$

$x = 5 \quad x = -5 \quad x = -\frac{3}{2}$

→ The roots are 0, 5, -5 and -1.5

2. Solve for x and graph final solution on a number-line.

(4)

$-4(3-5x) < 3(4x+4)$

$-12 + 20x < 12x + 12$

$-12 - 12 < 12x - 20x$

$-24 < -8x$

$\frac{-24}{-8} > x$

→ $3 > x$

3. Solve the following inequality algebraically and write solution using **set** notation **and** using **interval** notation.

(5)

$-3 < \frac{17-4x}{5} \leq 5$

$-15 < 17 - 4x \leq 25$

$-15 - 17 < -4x \leq 25 - 17$

$-32 < -4x \leq 8$

$\frac{-32}{-4} > x \geq \frac{8}{-4}$

$8 > x \geq -2$

→ Set Notation

$\{x \in \mathbb{R} \mid 8 > x \geq -2\}$

Interval notation

$[-2, 8)$

14/14

4. Solve (find intervals) for the following using a **factor table** Express answers using **set** and **interval** notation. Show work. **DO NOT** graph.

(8)

$$-3x(x+2)(x-5)(x-3) \geq 0$$

Zeroes: $-2, 0, 3, 5$

Intervals: $x \leq -2$, $-2 \leq x \leq 0$, $0 \leq x \leq 3$, $3 \leq x \leq 5$, $x \geq 5$

don't need leading coefficient for this problem. You have $-3x$ as the l.c.

	$x \leq -2$	$-2 \leq x \leq 0$	$0 \leq x \leq 3$	$3 \leq x \leq 5$	$x \geq 5$
$-3x$	+	+	−	−	−
$(x+2)$	−	+	+	+	+
$(x-5)$	−	−	−	−	+
$(x-3)$	−	−	−	+	+
Sign	−	+	−	+	−

$-2 \leq x \leq 0$ $\quad$ $3 \leq x \leq 5$

Set notation: $\{x \in \mathbb{R} \mid -2 \leq x \leq 0, 3 \leq x \leq 5\}$

Interval notation: $[-2, 0]$ $[3, 5]$

5. Given $f(x) = x^4 - 4x^3 - 5x^2 + 36x - 36$

a) Find the average rate of change for $x \in [-1, 1]$. Show work.

(2)

$-1 \leq x \leq 1$ $\quad$ Points: $(-1, -72)$, $(1, -8)$ (x_1, y_1; x_2, y_2)

$AROC = \frac{y_2 - y_1}{x_2 - x_1}$

$\frac{-8 - (-72)}{1 - (-1)} = \frac{64}{2} = 32$ $\quad$ AROC = 32

$f(-1) = (-1)^4 - 4(-1)^3 - 5(-1)^2 + 36(-1) - 36 = 1 + 4 - 5 - 36 - 36 = -72$

$f(1) = 1 - 4 - 5 + 36 - 36 = -8$

b) Find the instantaneous rate of change at $x = 3$ and $x = -2$. (use $h = 0.001$). Show work.

for $x = 3$ (4)

$\frac{f(a+h) - f(a)}{h}$

$\frac{f(3+0.001) - f(3)}{0.001}$

$= \frac{0.006013001 - 0}{0.001}$

$= 6.01301$

for $x = -2$

$\frac{f(-1.999) - f(-2)}{0.001}$

$= 47.92004799 - 19.980005 - 107.964$

$= \frac{-80.02395701 - (-80)}{0.001}$

$= -23.95701$

c) Which value of x from b) is at a turning point? Explain.

(1) 0

$(x-3)(x+3)(x^2-4x+4)$ $\quad$ Neither

$(x-3)(x+3)(x-2)(x-2)$

↳ -2 is a turning point because when graphed it makes a slope of 0 at the turning point (degree 2) $\quad$ zero

14/15