

Homework Questions?

1be 1.) $f(x) = (x+3)^3 + 4$
 2cd b) AROC $\rightarrow [-2, 1]$

$$\begin{aligned} \text{AROC} &= \frac{f(1) - f(-2)}{1 - (-2)} \\ &= \frac{68 - 5}{3} \\ &= \frac{63}{3} \\ &= 21 \end{aligned}$$

e) $(x+3)^3 + 4 = 3x + 11$

$$x^3 + 3x^2(3) + 3x(3)^2 + 3^3 + 4 = 3x + 11$$

$$x^3 + 9x^2 + 27x + 27 + 4 = 3x + 11$$

$$x^3 + 9x^2 + 24x + 20 = 0$$

$$(x+2)^2(x+5) = 0$$

$$\therefore x = -2 \text{ or } x = -5$$

$$y = 3(-2) + 11$$

$$= -6 + 11$$

$$= 5$$

$$(-2, 5)$$

$$y = 3(-5) + 11$$

$$= -15 + 11$$

$$= -4$$

$$(-5, -4)$$

$$\begin{aligned}
 2c) \quad f(x) &= a(x+3)(x-2)^2 && \text{point } (-2, -8) \\
 -8 &= a(-2+3)(-2-2)^2 \\
 -8 &= a(1)(-4)^2 \\
 -8 &= a(16) \\
 -\frac{1}{2} &= a \\
 \therefore f(x) &= -\frac{1}{2}(x+3)(x-2)^2
 \end{aligned}$$

$$\begin{aligned}
 \text{IROC} = m_T &= \frac{-\frac{1}{2}(h+3)(h+2-2)^2 - \left[-\frac{1}{2}(2+3)(2-2)^2\right]}{h} \Bigg|_{h \rightarrow 0} \\
 &= \frac{-\frac{1}{2}(h+3)(h)^2}{h}, \quad h \rightarrow 0 \\
 &= \frac{-\frac{1}{2}h^3 - \frac{3}{2}h^2}{h}, \quad h \rightarrow 0 \\
 &= -\frac{h^2}{2} - \frac{3}{2}h, \quad h \rightarrow 0 \\
 \text{IROC} &= 0
 \end{aligned}$$

$$2e) \quad -\frac{1}{2}(x+3)(x-2)^2 < -3$$

$$\begin{aligned}
 -\frac{1}{2}(x+3)(x^2-4x+4) + 3 &< 0 \\
 -\frac{1}{2}(x^3 - 1x^2 - 8x + 12) + 3 &< 0 \\
 -\frac{1}{2}x^3 + \frac{1}{2}x^2 + 4x - 6 + 3 &< 0 \\
 -\frac{1}{2}x^3 + \frac{1}{2}x^2 + 4x - 3 &< 0 \\
 -\frac{1}{2}(x^3 - x^2 - 8x + 6) &< 0 \\
 x^3 - x^2 - 8x + 6 &> 0 \\
 (x-3)(x^2 + 2x - 2) &> 0
 \end{aligned}$$

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(-2)}}{2(1)}$$

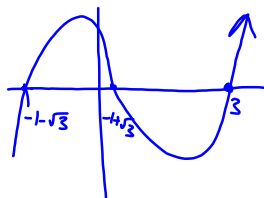
$$= \frac{-2 \pm \sqrt{4+8}}{2}$$

$$= \frac{-2 \pm \sqrt{12}}{2}$$

$$= \frac{-2 \pm 2\sqrt{3}}{2}$$

$$= -1 \pm \sqrt{3}$$

$$\begin{aligned}
 & \begin{matrix} \approx 0.732 & \approx -2.732 \\ \downarrow & \downarrow \end{matrix} \\
 & (x-3)(x-(-1+\sqrt{3}))(x-(-1-\sqrt{3})) > 0
 \end{aligned}$$



$$\begin{aligned}
 & \{x \in \mathbb{R} \mid -1-\sqrt{3} < x < -1+\sqrt{3}\} \\
 & \{x \in \mathbb{R} \mid x > 3\} \text{ OR }
 \end{aligned}$$

$$\text{Set } x \in \mathbb{R} \quad (-1-\sqrt{3}, -1+\sqrt{3}) \cup (3, \infty)$$

Stuff From Unit

→ Inequalities

→ Polynomial equations

$$|2x-3| < 3$$

→ Polynomial inequalities

$$2x-3 < 3$$

→ Polynomial Rates of Change

$$-(2x-3) < 3$$

$$2x-3 > -3$$

Review Day

pg. 241 #12 * use Desmos

pg. 240-241 #1b, 6acd, 7ad, 8cd, 10ad, 14c, 15

not only find an estimate at $x=5$, but find the exact rate of change too using the algebraically simplified difference quotient

pg. 242 Chapter Self-Test

(allow a maximum of 45 minutes).

Corrections to final answers:

#8a should only have “less than” inequality signs.

#8b - Answers may vary.

