MATH 1065 - Chapter 2 Review

2.2 5) Linear 6) Non-Linear

2.4 46) Vertex $(2,3)$ DOWN

Other Point $(0,-1)$

$y = a(x-h)^2 + k$

$y = a(x-2)^2 + 3$

$-1 = a(0-2)^2 + 3$

$-4 = 4a$

$-1 = a$

$\boxed{y = -(x-2)^2 + 3}$ OR $\boxed{y = -x^2 + 4x - 1}$

71) Find Points of Intersection

$f(x) = 2x - 1$

$g(x) = x^2 - 4$

$f(x) = g(x)$

$2x - 1 = x^2 - 4$

$0 = x^2 - 2x - 3$

$0 = (x-3)(x+1)$

$x = 3 \quad x = -1$

$(3,5)$ & $(-1,-3)$

2.6 ③ $p = -\frac{1}{6}x + 100$

what price will Maximize Revenue?

$R = x \cdot p$

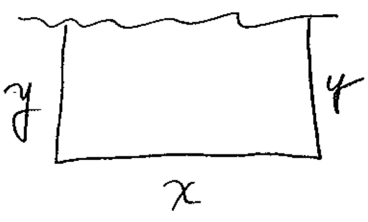
$R = -\frac{1}{6}x^2 + 100x \rightarrow$ Vertex $x = \frac{-b}{2a} = \frac{-100}{-1/3} = 300$

$R(300) = -15000 + 30{,}000 = \$15{,}000$

$p(300) = -\frac{1}{6}(300) + 100 = -50 + 100$

$50 price will Maximize Revenue

⑨



Given 4000 m of fencing, Maximize Area

$2y + x = 4000$

$\boxed{x = 4000 - 2y}$

$A_{\square} = xy$

$A = (4000 - 2y)y$

$A = -2y^2 + 4000y$

Vertex

$y = \frac{-4000}{-4} = 1000$ m

$x = 2000$ m

$A = xy = \boxed{2{,}000{,}000 \text{ m}^2}$

2.5

㉞ $h = -16t^2 + V_0 t + h_0$

$h = -16t^2 + 96t + 0$

b) $h = -16t^2 + 96t > 128$

$0 > 16t^2 - 96t + 128$

$0 > t^2 - 6t + 8$

$0 > (t-2)(t-4)$

$+ \quad - \quad +$ on a number line with marks at 2 and 4

$\boxed{2 < t < 4}$

2.7 (7) If $2-3i$ is a ZERO, so is $2+3i$

(29) $9x^2 - 12x + 4 = 0$ Determine the character of the Solutions

$$\text{DISCR} = b^2 - 4ac = (-12)^2 - 4(9)(4)$$

$$= 144 - 144 = 0 \Rightarrow$$

$\boxed{\text{1 Duplicated Real (Rational) Zero}}$

2.R (8) $f(x) = -\frac{1}{4}x + 2$ FIND ZERO

$$0 = -\frac{1}{4}x + 2$$

$$\boxed{x = 8}$$

(15) $g(x) = (x-3)^2 - 4$ Find ZEROS

$$0 = (x-3)^2 - 4$$

$$4 = (x-3)^2$$

$$\pm 2 = x - 3$$

$$3 \pm 2 = x$$

$x = 1, 5$ are the Zeros

(20) $P(x) = 3x^2 + 5x + 1$

$$0 = 3x^2 + 5x + 1$$

$$x = \frac{-5 \pm \sqrt{25 - 4(3)(1)}}{2(3)} \Rightarrow \boxed{\frac{-5 \pm \sqrt{13}}{6}}$$

(21) $f(x) = -2x^2 + x + 1$

$$0 = -2x^2 + x + 1$$

$$0 = 2x^2 - x - 1$$

$$0 = (2x+1)(x-1)$$

$$\boxed{x = -1/2 \qquad x = 1}$$

(27) $f(x) = x^4 - 5x^2 + 4$

$u = x^2$

$u^2 = x^4$

$$0 = u^2 - 5u + 4$$

$$(u-1)(u-4)$$

$u = 1 \qquad u = 4$

$x^2 = 1 \qquad x^2 = 4$

$$\boxed{x = \pm 1 \qquad x = \pm 2}$$

(30) $G(x) = 2(x+4)^2 + 3(x+4) - 14$

Let $u = x + 4$

$$0 = 2u^2 + 3u - 14$$

$$0 = (2u+7)(u-2)$$

$u = -7/2 \qquad u = 2$

$x + 4 = -7/2 \qquad x + 4 = 2$

$$\boxed{x = -15/2 \qquad x = -2}$$

(43) a $f(x) = -4x^2 + 4x$

Vertex $x = \frac{-4}{2(-4)} = 1/2$

$$f\left(\tfrac{1}{2}\right) = -1 + 2 = 1$$

$\boxed{\text{Vertex at } \left(\tfrac{1}{2}, 1\right) \text{ Axis: } x = \tfrac{1}{2}}$

(45) b $f(x) = \frac{9}{2}x^2 + 3x + 1$

Vertex $x = \frac{-3}{2\left(\frac{9}{2}\right)} = -\frac{1}{3}$

$f\left(-\frac{1}{3}\right) = \frac{1}{2} - 1 + 1 = \frac{1}{2}$

UP with

V: $\left(-\frac{1}{3}, \frac{1}{2}\right)$

D: $(-\infty, \infty)$

R: $\left[\frac{1}{2}, \infty\right)$

(47) c $f(x) = 3x^2 + 4x - 1$

Vertex $x = \frac{-4}{2(3)} = -2/3$ UP

Decrease $(-\infty, -2/3)$

Increase $(-2/3, \infty)$

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2.R (51) $f(x) = -x^2 + 8x - 4$

Vertex: $x = \frac{-8}{2(-1)} = 4$

$f(4) = -16 + 32 - 4 = $ ⑫ ↙ Maximum Value

(57) $3x^2 \geq 14x + 5$

$3x^2 - 14x - 5 \geq 0$

$(3x+1)(x-5) \geq 0$

$+ \quad | \quad - \quad | \quad +$

$\quad -\frac{1}{3} \qquad 5$

$\boxed{(-\infty, -\frac{1}{3}] \cup [5, \infty)}$

(64) $F(x) = -3x^2 + 6x - 5$

$$x = \frac{-6 \pm \sqrt{\overset{-24}{36 - 4(-3)(-5)}}}{2(-3)}$$

$$\frac{-6 \pm 2i\sqrt{6}}{-6} \Rightarrow \boxed{\frac{3 \pm i\sqrt{6}}{3}}$$

OR $1 \pm \frac{\sqrt{6}}{3} i$

(69) $|2-3x| + 2 = 9$

$|2-3x| = 7$

$2-3x = 7$ OR $2-3x = -7$

$-3x = 5 \qquad -3x = -9$

$x = -5/3$ OR $x = 3$

(71) $|3x+4| < \frac{1}{2}$

$3x+4 < \frac{1}{2}$ AND $3x+4 > -\frac{1}{2}$

$-\frac{1}{2} < 3x+4 < \frac{1}{2}$

$-\frac{9}{2} < 3x < -\frac{7}{2}$

$-\frac{3}{2} < x < -\frac{7}{6}$

$\boxed{(-\frac{3}{2}, -\frac{7}{6})}$

(73) $|2x-5| \geq 9$

$2x-5 \geq 9$ OR $2x-5 \leq -9$

$2x \geq 14 \qquad 2x \leq -4$

$x \geq 7$ OR $x \leq -2$

$\boxed{(-\infty, -2] \cup [7, \infty)}$