

Name..... Key .....

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section 12D

Question 1. Graph the function:

1)  $f(x) = -2x^2 - 12x - 10$

①  $a = -2 < 0$  downward (maximum)  
 $b = -12$   
 $c = -10$

② Vertex  $(\frac{-b}{2a}, f(\frac{-b}{2a})) = (-3, 8)$  ①

①  $x = \frac{-b}{2a} = \frac{-(-12)}{2(-2)} = -3$

①  $f(-3) = -2(-3)^2 - 12(-3) - 10 = -18 + 36 - 10 = 8$

↓ optimal value maximum

③ Zeros ( $y=0$ )

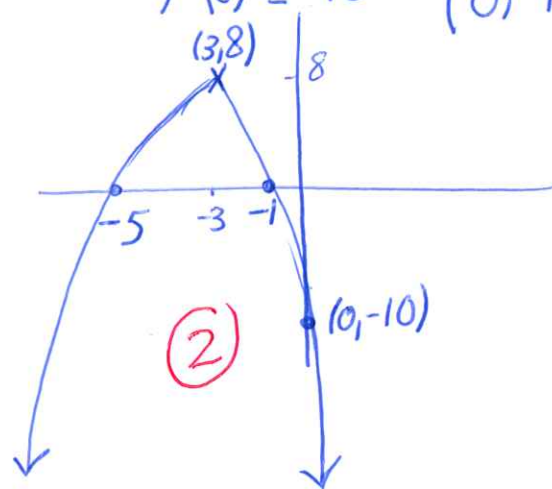
$$\frac{-2x^2 - 12x - 10}{-2} = \frac{0}{-2}$$

$$x^2 + 6x + 5 = 0$$

②

$$(x+5)(x+1) = 0 \Rightarrow x = -1, -5$$

④ y-intercept ( $x=0$ )  
 $f(0) = -10$  (0, -10) ①



Question 2. Solve the equation:

$$x^2 + 5 = 2x$$

$$x^2 + 5 - 2x = 0$$

$$x^2 - 2x + 5 = 0$$

$a = 1$   
 $b = -2$   
 $c = 5$

②

$$d = b^2 - 4ac$$

$$= (-2)^2 - 4(1)(5)$$

$$= 4 - 20 = -16 < 0$$

no solution

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Name..... key .....

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section 14D

Question 1. Graph the function:

1)  $f(x) = x^2 - 6x + 9$

①  $a=1 > 0$  upward (minimum)

$b = -6$

$c = 9$

② vertex  $(-\frac{b}{2a}, f(-\frac{b}{2a})) = (3, 0)$

$x = -\frac{b}{2a} = -\frac{-6}{2(1)} = 3$

optimal value minimum

$f(3) = 3^2 - 6(3) + 9 = 0$

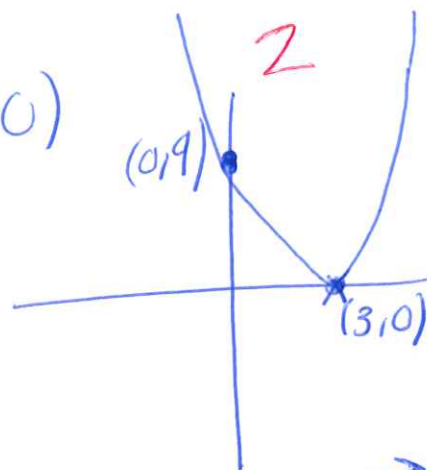
③ Zeros ( $y=0$ )

$x^2 - 6x + 9 = 0$

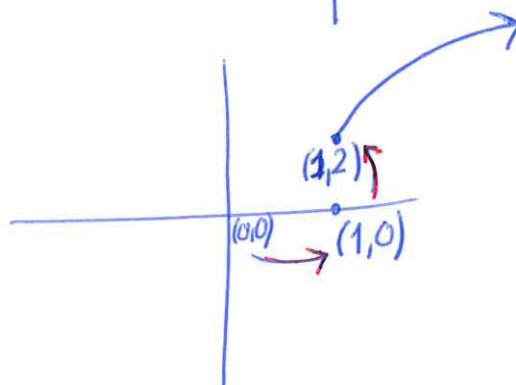
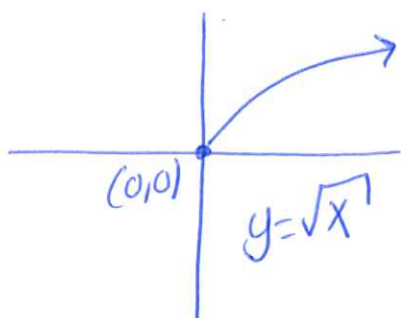
$(x-3)(x-3) = 0$

$x = 3$

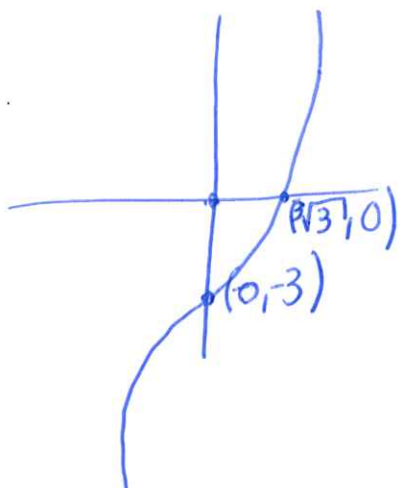
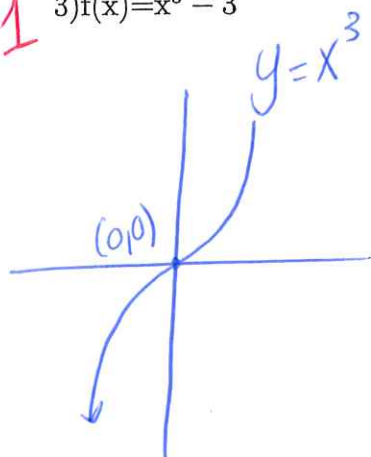
④ y-intercept ( $x=0$ )  
 $\Rightarrow y = 9$  (0,9)



2)  $f(x) = \sqrt{x-1} + 2$



3)  $f(x) = x^3 - 3$



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section 1D

Question 1. Graph the function:

1)  $f(x) = x^2 - 6x + 8$

①  $a = 1 > 0$  upward (minimum)

$b = -6$   
 $c = 8$

② Vertex  $(\frac{-b}{2a}, f(\frac{-b}{2a})) = (3, -1)$

$x = \frac{-b}{2a} = \frac{-(-6)}{2(1)} = 3 \rightarrow$  ② optimal value.

$f(3) = 9 - 18 + 8 = -1$

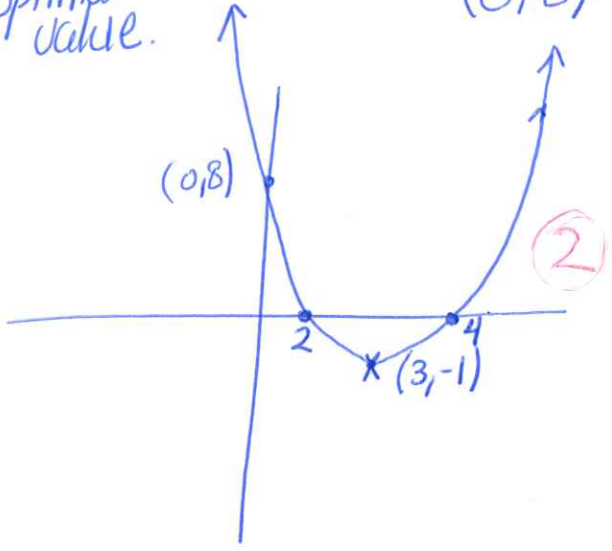
③ zeros ( $y=0$ )

$x^2 - 6x + 8 = 0$

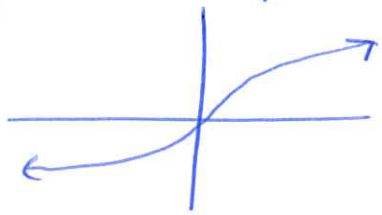
$(x-4)(x-2) = 0$

$x = 2, 4$  ②

④ y-intercept  
① ( $x=0$ )  
 $f(0) = 8$   
(0, 8)

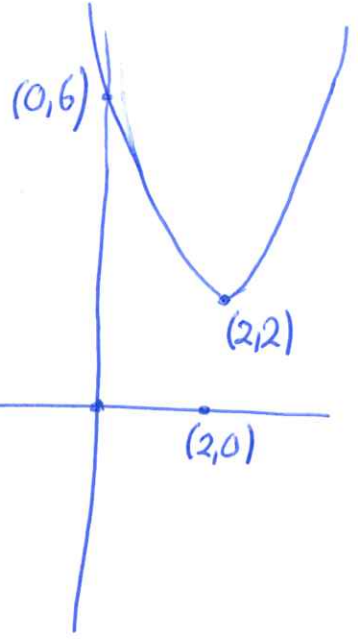
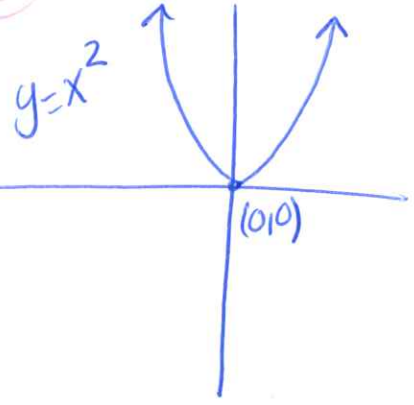


① 2)  $f(x) = x^{\frac{1}{3}} = \sqrt[3]{x}$



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

②



y-intercept  
 $x = 0$   
 $f(0) = (-2)^2 + 2 = 6$



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section 14D

Question 1. Graph the function:

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

①  $a = 1 > 0$  upward (minimum)  
 $b = 2$   
 $c = -3$

② Vertex  $(-1, -4)$  optimal value  
 $x = \frac{-b}{2a} = \frac{-2}{2(1)} = -1$

$f(-1) = 1 + -2 - 3 = -4$

③ x-intercept ( $y=0$ )

$x^2 + 2x - 3 = 0$   
 $(x+3)(x-1) = 0 \Rightarrow x = -3, 1$

Question 2. Solve the equation.

$x = x^2 + 2x + 4$   
 $-x \quad -x$

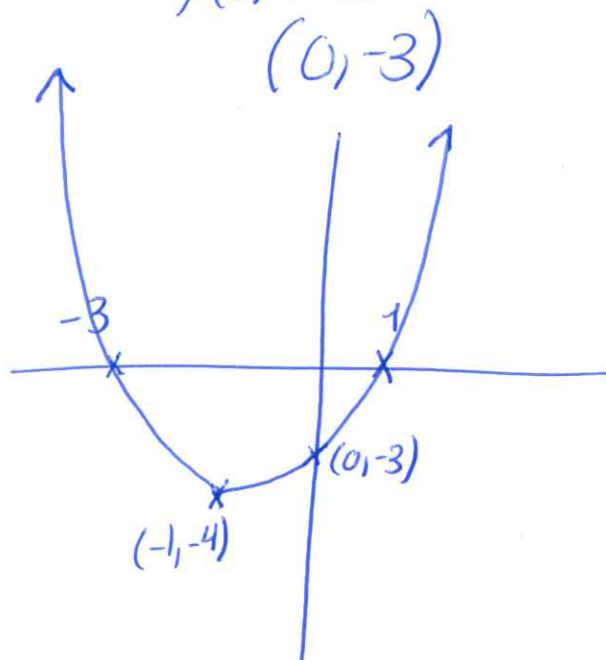
$x^2 + x + 4 = 0$

$a = 1$   
 $b = 1$   
 $c = 4$

$d = b^2 - 4ac$   
 $= 1 - 4(1)(4)$   
 $= 1 - 16$   
 $= -15 < 0$

no solution.

④ y-intercept  $x=0$   
 $f(0) = -3$   
 $(0, -3)$



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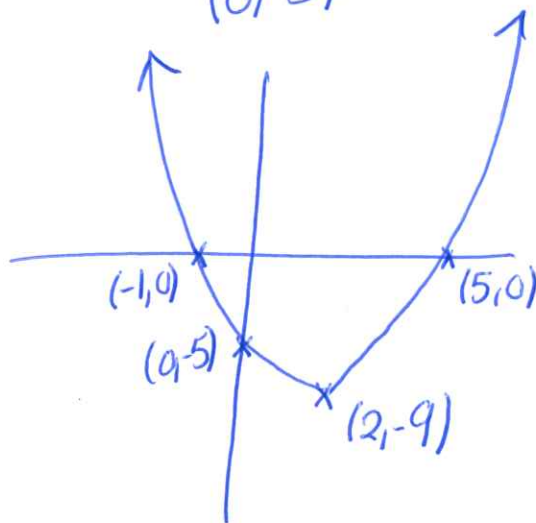
section 6D

Question 1. Graph the function:

1)  $f(x) = x^2 - 4x - 5$

①  $a=1 > 0$  upward (minimum)  
 $b=-4$   
 $c=-5$

④ y-intercept  $x=0$   
 $f(0) = -5$   
 $(0, -5)$



② vertex  $(2, -9)$  → Optimal value.

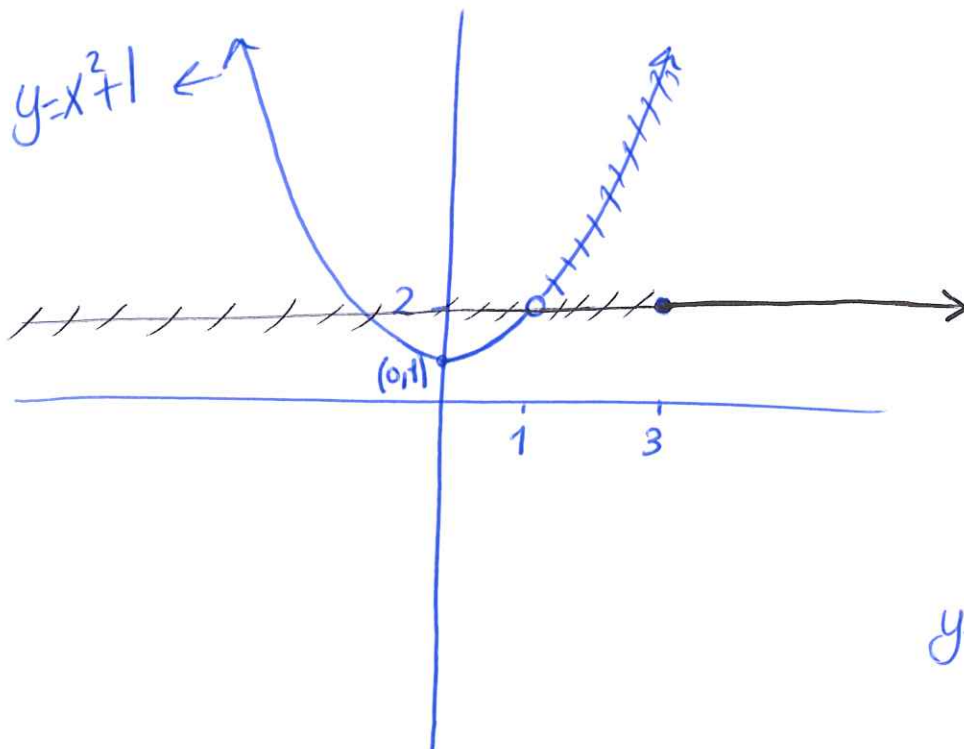
$x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = 2$

$f(2) = 4 - 8 - 5 = -9$

③ zeros ( $y=0$ )  
 $0 = x^2 - 4x - 5$   
 $0 = (x-5)(x+1) \Rightarrow x = -1, 5$

Question 2. Graph the function.

3)  $f(x) = \begin{cases} x^2 + 1, & x < 1 \\ 2, & x \geq 3 \end{cases}$



$y = x^2 + 1$   
 $y = x^2$  up one unit

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section 10D

Question 1. Graph the function:

1)  $f(x) = x^2 + 6x - 27$

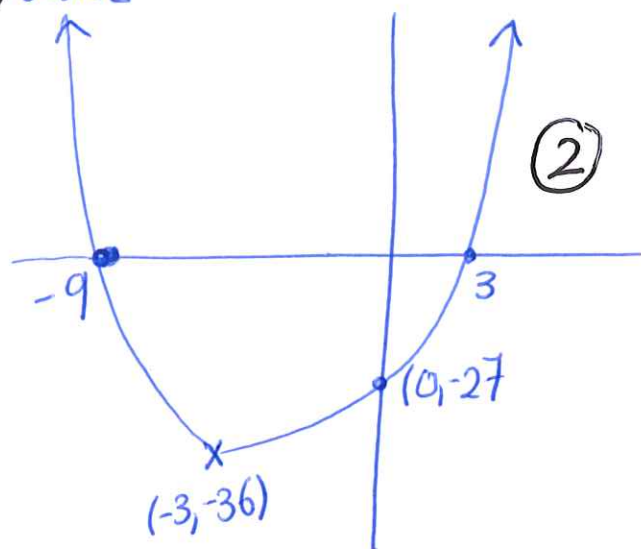
①  $a=1 > 0$  upward (minimum)  
 $b=6$   
 $c=-27$

② vertex  $(-\frac{b}{2a}, f(-\frac{b}{2a})) = (-3, -36)$   
 $x = -\frac{b}{2a} = -\frac{6}{2(1)} = -3$   
optimal value

$f(-3) = 9 + -18 - 27 = -36$

③ Zeros ( $y=0$ )  
 $x^2 + 6x - 27 = 0$   
 $(x+9)(x-3) = 0 \Rightarrow x = -9, 3$

④ y-intercept  
 $x=0$   
 $\Rightarrow f(0) = -27$   
 $(0, -27)$

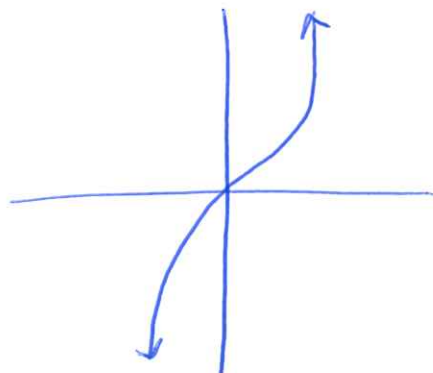


Question 2. Graph the function.

1)  $y = x^{\frac{1}{2}} = \sqrt{x}$



2)  $y = (x-1)^3 + 2$



$y = x^3$

