Author: Trinuha Akilathasan

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Chapter 2 - 2.4

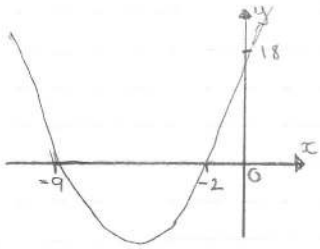
① a) $y=x^2+11x+18$

$y=(0)^2+11(0)+18$

y axis $(0,18)$

$(x+9)(x+2)$

$x=-9, -2$



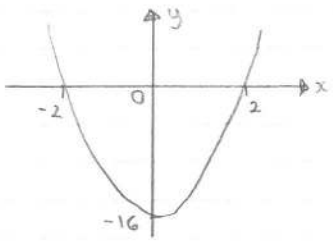
b) $y=4x^2-16$

$4(0)^2-16=-16$

y axis $(0,-16)$

$4(x^2-4) \rightarrow x^2-4=0$

$x^2=4 \rightarrow x=2,-2$



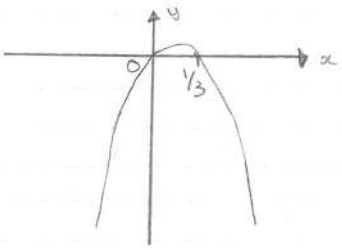
c) $y=-6x^2+2x$

$y=-6(0)^2+2(0)=0$

y axis $(0,0)$

$x(-6x+2)=0$

$x=0, x=1/3$



② a) $y=(x-1)^2+9$

$v=y=(x-1)^2+9$

$(1,9)$

b) $y=x^2+x-6$

$y=(x^2+x+1/4)-1/4-6$

$y=(x+1/2)^2-25/4$

$v=y=(x+1/2)^2-25/4$

$(-1/2, -25/4)$

c) $y=-x^2-13x-42$

$y=-(x^2+13x)-42$

$y=-(x^2+13x+\frac{169}{4})+\frac{169}{4}-42$

$y=-(x+13/2)^2+169/4-168/4$

$y=-(x+13/2)^2+1/4$

$(-13/2, 1/4)$

③ a) $y=x^2-6x+20$

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

turning point $(3,11)$

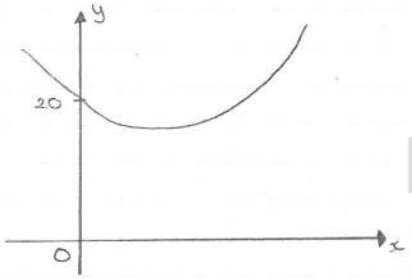
$y=0^2+6(0)+20=20$

y intercept $(0,20)$

discriminant $=(-6)^2-4(1)(20)$

$=36-80=-44$

axis symmetry $x=3$



b) $y=-2x^2-5x-2$

$y=-2(x+5/4)^2+9/8$

turning point $(-5/4, 9/8)$

$y=-2(0)^2-5(0)-2=-2$

y intercept $=(0,-2)$

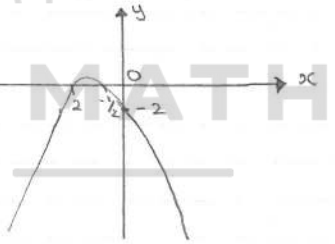
discriminant $=(-5)^2-4(-2)(-2)$

$=25-16=9$

roots $x=\frac{5\pm3}{-4}$ $x=-2$ $x=-1/2$

$(-2,0), (-1/2,0)$

axis symmetry $x=-5/4$



c) $4x^2-y=4x+3$

$y=4x^2-4x-3$

$y=4(x-1/2)^2-4$

turning point $(1/2, -4)$

axis symmetry $x=1/2$

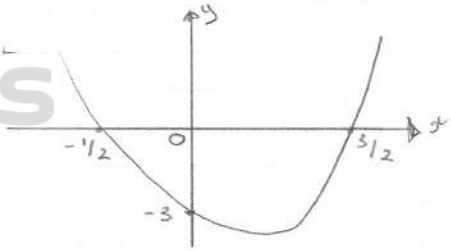
$y=4(0)^2-4(0)-3=-3$

y intercept $(0,-3)$

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

$x^2-x-3/4=0$

$x=\frac{1\pm\sqrt{2}}{2}$ $(3/2,0)$ $(-1/2,0)$



④ a) $x^2+7x+5=0$

$x=\frac{-7\pm\sqrt{29}}{2}$

$y=0^2+7(0)+5=5$

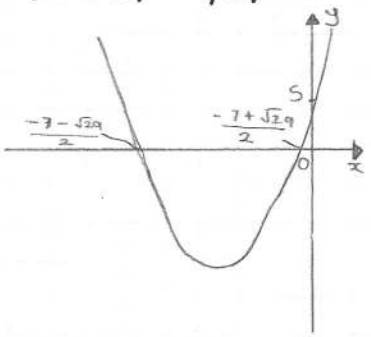
y axis $(0,5)$

axis symmetry $x=-7/2$

$x=-b/2a=-7/2(1)=-7/2$

$y=(-7/2)^2+7(-7/2)+5=-29/4$

$(-7/2, -29/4)$



b) $y=-5x^2-12x-3$

$x=\frac{-6\pm\sqrt{21}}{5}$

$y=-5(0)^2-12(0)-3=-3$

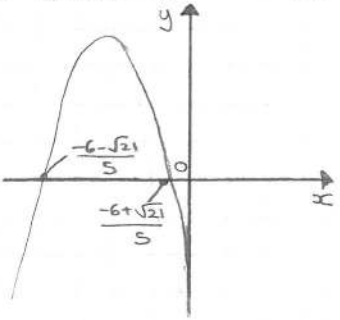
y axis $(0,-3)$

$x=-b/2a=-12/2(-5)=-6/5$

$y=-5(-6/5)^2-12(-6/5)-3=24/5$

$(-6/5, 24/5)$

axis symmetry $x=-6/5$



c) $y=2x^2+7x+4$

$x=\frac{-7\pm\sqrt{17}}{4}$

$y=2(0)^2+7(0)+4=4$

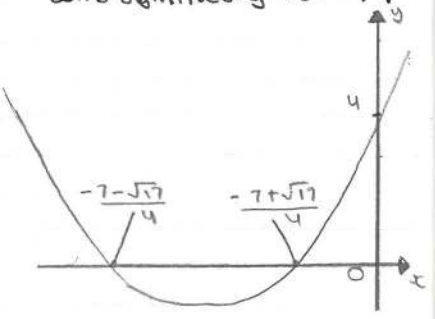
y axis $(0,4)$

$x=-b/2a=-7/2(2)=-7/4$

$y=2(-7/4)^2+7(-7/4)+4=-17/8$

$(-7/4, -17/8)$

axis symmetry $x=-7/4$



⑤ a) $y = 8x - 7 - x^2$

$y = -x^2 + 8x - 7$

$y = -(x^2 - 8x) - 7$

$x^2 - 8x \rightarrow (-4)^2 = 16$

$y = -((x^2 - 8x + 16) - 16) - 7$

$y = -(x-4)^2 + 16 - 7$

$y = -(x-4)^2 + 9$

$y = 9 - (x-4)^2$

$p = 4$ and $Q = 9$

b) (p, q) $(4, q)$

$y = 8(0) - 7 - (0)^2 = -7$

y intercept $(0, -7)$

$0 = -(x-4)^2 + 9$

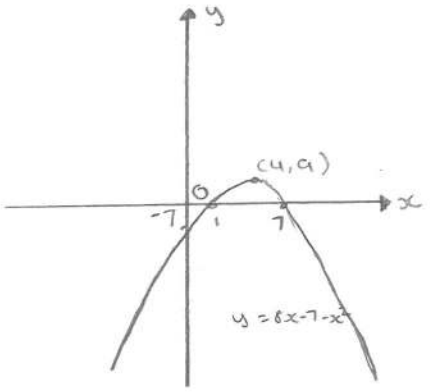
$(x-4)^2 = 9$

$x - 4 = \pm 3$

$x = 4 + 3 = 7$

$x = 4 - 3 = 1$

$(7, 0)$ $(1, 0)$



⑥ a) $f(x) = x^2 + 6x + 4$

$x^2 + 6x \rightarrow (3)^2 = 9$

$f(x) = x^2 + 6x + 9 - 9 + 4$

$f(x) = (x+3)^2 - 9 + 4$

$f(x) = (x+3)^2 - 5$

$\therefore f(x) = (x+3)^2 - 5$

$a = 3$ $b = -5$

b) $x = 0$ $f(x) = x^2 + 6x + 4$

$f(0) = 0^2 + 6(0) + 4 = 4$

y intercept $(0, 4)$

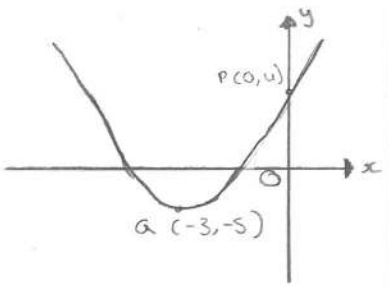
$f(x) = (x+3)^2 - 5$

$x = -3$

$f(-3) = (-3+3)^2 - 5 = -5$

Q $(-3, -5)$

$f(x) = x^2 + 6x + 4$



c) smallest y-value of the curve in part b) is -5, so $f(x) = -6$, cannot have real solutions

⑦ a) $q(x) = 0$

$q(x) = x^2 - 9x - 10 = 0$

$(x-10)(x+1) = 0$

$x - 10 = 0$ $x = 10$

$x + 1 = 0$ $x = -1$

$x = 10$, $x = -1$

b) $p(x) = 3 - 2x$

y intercept $(0, 3)$

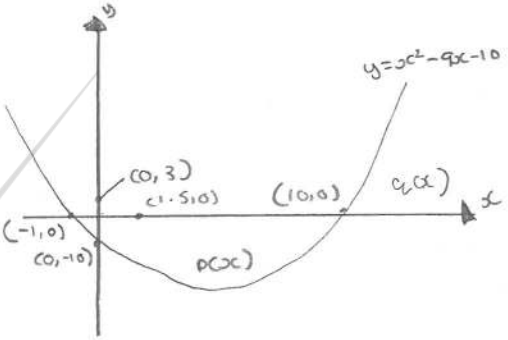
$x = 10$, $x = -1$

$3 + 2x \rightarrow x = 3/2$

$= (1.5, 0)$

$q(0) = (0)^2 - 9(0) - 10 = -10$

y intercept $(0, -10)$



⑧ max point $(2, -5)$

$(3, 0)$

$y = ax^2 + bx + c$

$4a + 2b + c = -5$

$9a + 3b + c = 0$

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

$h = 2$ $k = -5$

$y = a(x-2)^2 - 5$

$x = 3$, $y = 0$

$0 = a(3-2)^2 - 5$

$0 = (a)(1)^2 - 5$

$a = 5$

$y = 5(x-2)^2 - 5$

$(x-2)^2$

$y = 5(x^2 - 4x + 4) - 5$

$y = 5x^2 - 20x + 20 - 5$

$y = 5x^2 - 20x + 15$

$ax^2 + bx + c$

$a = 5$

$b = -20$

$c = 15$