P-25 Analyze each quadratic function using the formulas on D-25. Sketch each parabola showing the vertex, the y-intercept and any x-intercepts.

1. $y = x^2 - 4x + 5$

$a=1 \quad b=-4 \quad c=5$

① opens up since $a>0$

② vertex is $\left(-\frac{-4}{2\cdot 1}, 5-\frac{(-4)^2}{4\cdot 1}\right)$

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

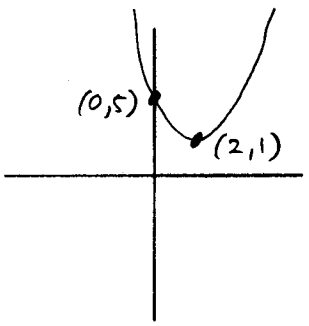
③ y-intercept is $(0,5)$

④ x-intercepts:

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(5)}}{2\cdot 1}$

$= \frac{4 \pm \sqrt{16-20}}{2}$ ← $16-20=-4<0$

no no x-intercepts!



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

$a=1 \quad b=-2 \quad c=-3$

① opens up

② vertex: $\left(-\frac{-2}{2}, -3-\frac{4}{4}\right)$

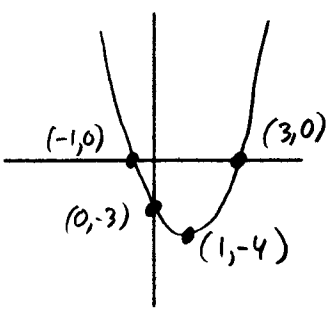
$= (1, -4)$

③ y-int. $(0,-3)$

④ x-int. @ $x = \frac{2 \pm \sqrt{4+12}}{2}$

$= \frac{2 \pm \sqrt{16}}{2} = \frac{2 \pm 4}{2} = 3$ or -1

no x-int. are $(3,0)$ and $(-1,0)$



3. $y = x^2 + 2x + 2$

$a=1 \quad b=2 \quad c=2$

① opens up

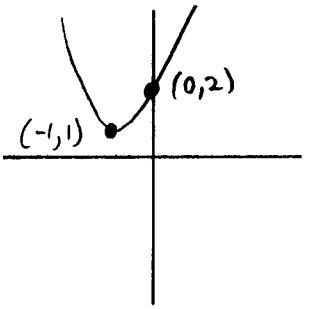
② vertex: $\left(-\frac{2}{2}, 2-\frac{4}{4}\right)$

$= (-1, 1)$

③ y-int.: $(0,2)$

④ x-int: $x = \frac{-2 \pm \sqrt{4-8}}{2}$

no no x-intercepts



4. $y = 2x^2 - 4x - 16$

$a=2 \quad b=-4 \quad c=-16$

① opens up

② vertex: $\left(-\frac{-4}{4}, -16-\frac{16}{8}\right)$

$= (1, -18)$

③ y-int: $(0,-16)$

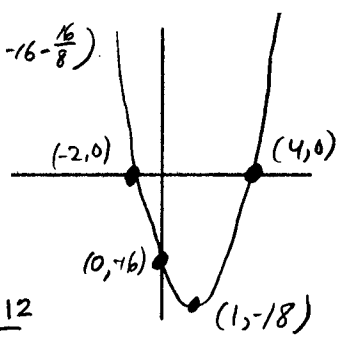
④ x-intercepts:

$x = \frac{4 \pm \sqrt{16+128}}{4}$

$= \frac{4 \pm \sqrt{144}}{4} = \frac{4 \pm 12}{4}$

$= 4$ or -2

x-int. are $(4,0)$ and $(-2,0)$



5. $y = -x^2 + 6x + 16$

$a=-1 \quad b=6 \quad c=16$

① opens down

② vertex $\left(\frac{-6}{2\cdot(-1)}, 16-\frac{36}{-4}\right)$

$= (3, 16+9) = (3,25)$

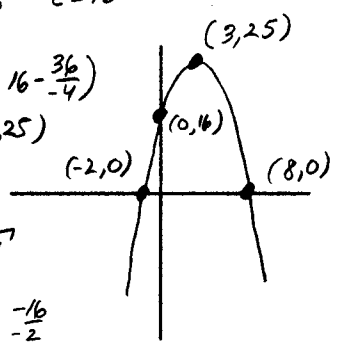
③ y-int is $(0,16)$

④ x-intercepts:

$x = \frac{-6 \pm \sqrt{36+64}}{-2}$

$= \frac{-6 \pm 10}{-2} = \frac{4}{-2}$ or $\frac{-16}{-2}$

$= -2$ or 8 so x-intercepts are $(-2,0)$ and $(8,0)$



6. $y = 3x^2 + 6x + 4$

$a=3 \quad b=6 \quad c=4$

① opens up

② vertex: $\left(-\frac{6}{6}, 4-\frac{36}{12}\right)$

$= (-1, 4-3) = (-1,1)$

③ y-int. $(0,4)$

④ x-intercepts:

$x = \frac{-6 \pm \sqrt{36-48}}{6}$

no no x-intercepts