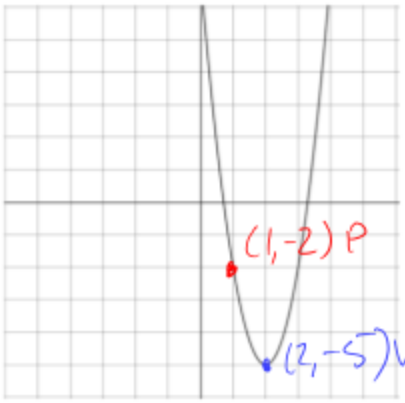
Full credit will only be awarded for all work shown in a neat and organized manner.

1. Find the equation for the parabola shown in the graph below



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

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

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

$3=a$

$\boxed{f(x)=3(x-2)^2-5}$

2. Find the equation of the parabola that: *(If you need graph paper, grab some at the back)*
   a. has a vertex at (-3,2) and passes through (1,-7)

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

$f(1)=-7=a(1+3)^2+2$

$-7=a(4)^2+2$

$-9=16a$

$a=-\frac{9}{16}$

$\boxed{f(x)=-\frac{9}{16}(x+3)^2+2}$

   b. passes through (2,0), (6,6), (-4,6)

$h=\frac{6+(-4)}{2}=\frac{2}{2}=1$

$f(x)=a(x-1)^2+k$

① $(6,6)$

$f(6)=6=a(6-1)^2+k$

$6=25a+k$

$k=6-25a$

② $(2,0)$

$f(2)=0=a(2-1)^2+k$

$0=a+k$

$k=-a$

$-a=6-25a$

$24a=6 \Rightarrow a=\frac{1}{4} \Rightarrow k=-a=-\frac{1}{4}$

$\boxed{f(x)=\frac{1}{4}(x-1)^2-\frac{1}{4}}$

3. Given the parabola: $f(x) = 2x^2 + 4x - 15$
   a. Find the axis of symmetry of $f(x)$ by **completing the square** (no shortcut allowed!)
   b. Find the x-intercepts of $f(x)$ (*give exact answers)*

a) $f(x) = 2\left[(x^2+2x+k)-k\right]-15$ $\quad k=\left(\frac{2}{2}\right)^2=1$

$= 2\left[(x^2+2x+1)-1\right]-15$

$= 2\left[(x+1)^2-1\right]-15$

$= 2(x+1)^2-17$

$h=-1$

$\rightarrow$ **$x=-1$**

b) $2(x+1)^2-17=0$

$2(x+1)^2=17$

$(x+1)=\pm\sqrt{\frac{17}{2}}$

$x=-1\pm\sqrt{\frac{17}{2}}$

$\left(-1+\sqrt{\frac{17}{2}},0\right),\left(-1-\sqrt{\frac{17}{2}},0\right)$

4. Given the parabola: $f(x) = -\frac{1}{2}x^2 + 2x - 6$
   a. Find the vertex of $f(x)$ by **completing the square** (no shortcut allowed!)
   b. Find the x-intercepts **and** y-intercept of $f(x)$ (*give exact answers)*

a) $f(x) = -\frac{1}{2}\left[(x^2-4x+k)-k\right]-6$ $\quad \left(\frac{-4}{2}\right)^2=4$

$= -\frac{1}{2}\left[(x^2-4x+4)-4\right]-6$

$= -\frac{1}{2}\left[(x-2)^2-4\right]-6$

$= -\frac{1}{2}(x-2)^2+2-6$

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

Vertex: **$(2,-4)$**

b) $0=-\frac{1}{2}(x-2)^2-4$

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

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

$\pm\sqrt{-8}=(x-2)$

↑ no answer

No x-ints

$f(0)=-\frac{1}{2}(0-2)^2-4$

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

$=-2-4=-6$ **$(0,-6)$**