Solve and sketch the graph. Be sure to identify the # of extrema, degree, end behavior and multiplicity of the roots.

1. $f(x) = -(x^2 - 5x - 24)^2$

$-[(x-8)(x+3)]^2$

# of extrema: 3

Degree: 4

y-int: (0, -576)

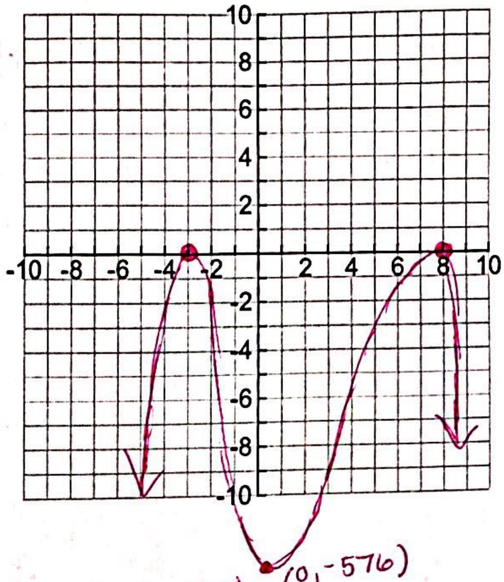
End behavior:

$x \to$ ∞ $y \to$ $-\infty$

$x \to$ $-\infty$ $y \to$ $-\infty$

Roots: 8 (DR), -3 (DR)

(8, 0), (-3, 0)



2. $f(x) = -(x+1)^3 + 16(x+1)$

$-(x+1)[(x+1)^2 - 16]$

# of extrema: 2

$-(x+1)[(x+1+4)(x+1-4)]$

Degree: 3

$-(x+1)(x+5)(x-3)$

End behavior:

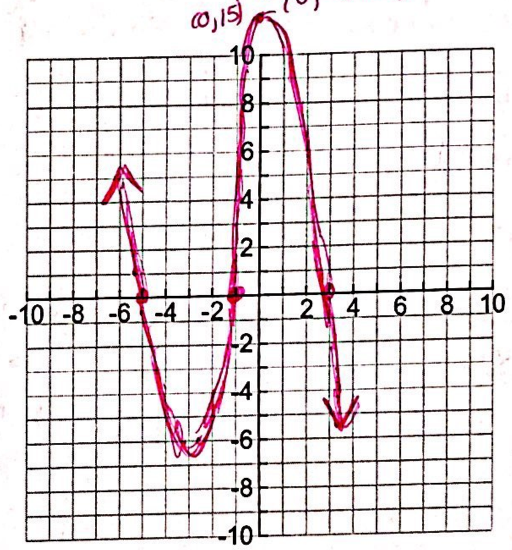
y-int: (0, 15)

$x \to$ ∞ $y \to$ $-\infty$

$x \to$ $-\infty$ $y \to$ ∞

Roots: (-1, 0) (-5, 0) (3, 0)

-1, -5, 3



3. $f(x) = x^4 - 15x^2 - 16$

$(x^2-16)(x^2+1)$

$(x+4)(x-4)(x^2+1)$

# of extrema: 3

$x^2+1=0$

$x^2=-1$

$x=\pm i$

Degree: 4

End behavior:

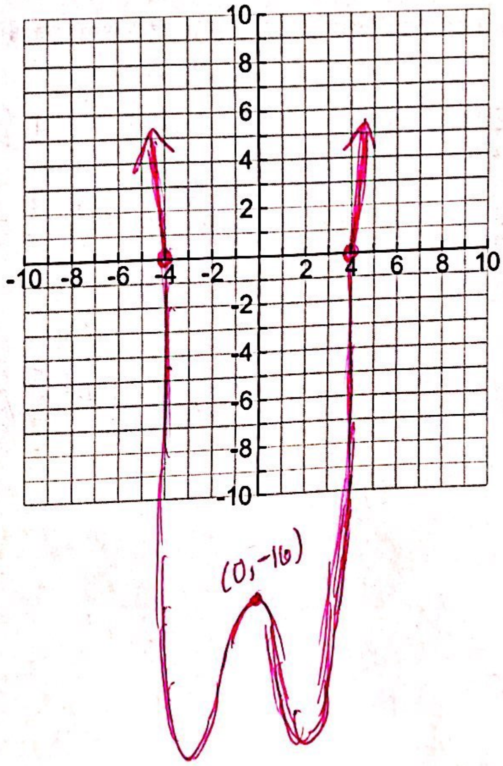
y-int: (0, -16)

$x \to$ ∞ $y \to$ ∞

$x \to$ $-\infty$ $y \to$ ∞

Roots: (-4, 0) (4, 0)

-4, 4, $\pm i$



Solve. Identify multiple roots. Also, find the y-intercept of each and describe the end behavior.

4. $(x+1)(x^2-4)=0$

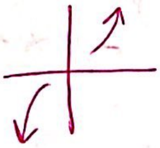
$(x+1)(x+2)(x-2)=0$

$x=-1,\ x=-2,\ x=2$

y-int: $(0,-4)$

R: $x \to \infty,\ y \to \infty$

L: $x \to -\infty,\ y \to -\infty$.



5. $(x^2-1)(x^2+3x+2)=0$

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

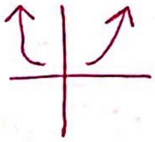
$x=-1,\ x=1,\ x=-2$

DR

y-int: $(0,-2)$

R: $x \to \infty,\ y \to \infty$

L: $x \to -\infty,\ y \to \infty$



6. $(x+1)^3-(x+1)=0$

$(x+1)[(x+1)^2-1]=0$

$(x+1)[(x+1+1)(x+1-1)]=0$

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

y-int: $(0,0)$

$x=0,\ x=-1,\ x=-2$

R: $x \to \infty,\ y \to \infty$

L: $x \to -\infty,\ y \to -\infty$

7. $-(x+2)^3(x-3)=0$

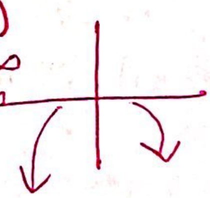
$x=-2,\ x=3$

TR

y-int: $(0,24)$

R: $x \to \infty,\ y \to -\infty$

L: $x \to -\infty,\ y \to -\infty$



Find a quadratic equation with integral coefficients having the given roots.

8. $\frac{-3+7i}{2}$ *and* $\frac{-3-7i}{2}$

$4x^2+12x+58=0$

or $2x^2+6x+29=0$

9. $\frac{-6+\sqrt{7}}{4}$ *and* $\frac{-6-\sqrt{7}}{4}$

$16x^2+48x+29=0$