③ $y = x^3 - 4x^2 + x + 6$ $\quad x = -1$

$y = (-1)^3 - 4(-1)^2 + (-1) + 6$ $\quad (x+1)$ is a factor

$y = -1 - 4 - 1 + 6$

$y = 0$

$$\begin{array}{r|l} x+1 & x^2 - 5x + 6 \\ \hline & x^3 - 4x^2 + x + 6 \\ & -(x^3 + x^2) \\ & \hline & -5x^2 + x \\ & -(-5x^2 - 5x) \\ & \hline & 6x + 6 \\ & -(6x + 6) \\ & \hline & 0 \end{array}$$

Simple Trinomial

$y = (x+1)(x^2 - 5x + 6)$

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

b) Roots: $(y=0)$

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

$x = -1, 2, 3$

c) y int $(x=0)$

$y = (0+1)(0-2)(0-3)$

$y = (1)(-2)(-3)$

$y = 6$

d) Since it is a 3rd Degree Polynomial with a positive stretch Q3 → Q1

approx local max: $(x = 0.5)$

$y = (0.5+1)(0.5-2)(0.5-3)$

$y = (1.5)(-1.5)(-2.5)$

$y = 5.6$

$(0.5, 5.6)$

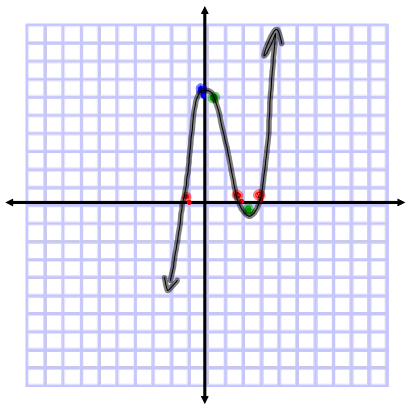
approx local min $(x = 2.5)$

$y = (2.5+1)(2.5-2)(2.5-3)$

$y = (3.5)(0.5)(-0.5)$

$y = -0.875$

$(2.5, -0.875)$



⑤ $x^2 + x \geq 30$

$x^2 + x - 30 \geq 0$

a → 2nd Degree (+ stretch)

$y = x^2 + x - 30$

(i) Roots:

$y = x^2 + x - 30$

$y = (x+6)(x-5)$

$0 = (x+6)(x-5)$

$x = -6, 5$

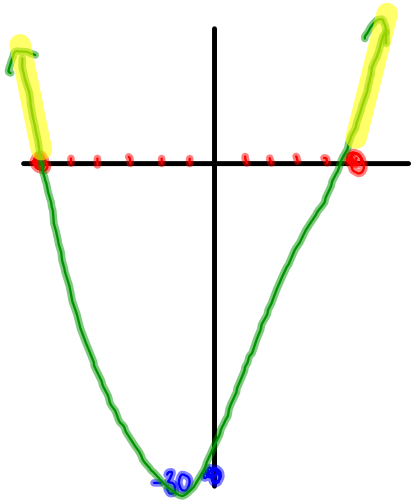
(ii) y int:

$y = x^2 + x - 30$

$y = 0 + 0 - 30$

$y = -30$

(iii) Graph



(iv) Intervals:

$x \in (-\infty, -6] \cup [5, \infty)$

Review #1

① g) $9x^4+26x^2+25$ $\quad *\sqrt{9\cdot 25}$

$\sqrt{225}=15\cdot 2=30$

$(9x^4+30x^2+25)-4x^2$

$(3x^2+5)(3x^2+5)-4x^2$

$(3x^2+5)^2-4x^2$

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

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

④ $f(x)=2x^2+5$ $\quad g(x)=x-3$

a) $f(g(x))$

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

$=2(x^2-6x+9)+5$

$=2x^2-12x+18+5$

$=2x^2-12x+23$

④ $f(x)=2x^2+5$ $\quad g(x)=x-3$

d) $g(f(-3))$

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

$=18+5$

$=23$

$g(23)=23-3$

$=20$

③ $y = x^3 - 4x^2 + x + 6$

a) $(x-2)$ is a factor

$$x-2 \;\overline{)\; x^3 - 4x^2 + x + 6}$$

$x^2 - 2x - 3$

$-(x^3 - 2x^2)$

$-2x^2 + x$

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

$-3x + 6$

$-(-3x + 6)$

0

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

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

b) Roots

$x = -1, 2, 3$

c) y int

$y = 6$

d) local max $(x = 0.5)$

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

$y = (-1.5)(-2.5)(1.5)$

$y = 5.625$

approx. $(0.5, 5.625)$

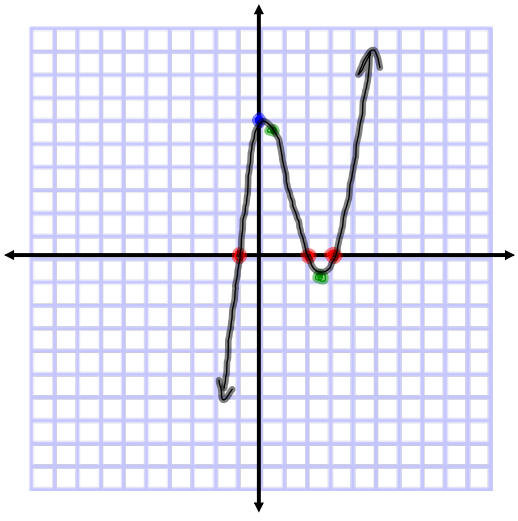
e) local min $(x = 2.5)$

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

$y = (0.5)(-0.5)(3.5)$

$y = -0.875$

$(2.5, -0.875)$



3rd Degree Polynomial with a positive stretch factor

Review # 1

① i) $4x^2 - c^2 - 12x + 9$

$(4x^2 - 12x + 9) - c^2$

$(2x-3)^2 - c^2$

$(2x-3+c)(2x-3-c)$

Review #2

⑥ $x^3 - x^2 < 12x$ ← "y" values are less than 0 (y is negative)

$x^3 - x^2 - 12x < 0$

$y = x^3 - x^2 - 12x$

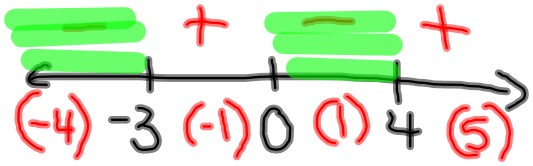
$y = x(x^2 - x - 12)$

$y = x(x+3)(x-4)$

① Roots:

$x = -3, 0, 4$

②/③



④ $x \in (-\infty, -3) \cup (0, 4)$