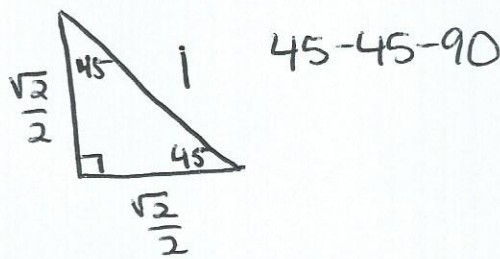
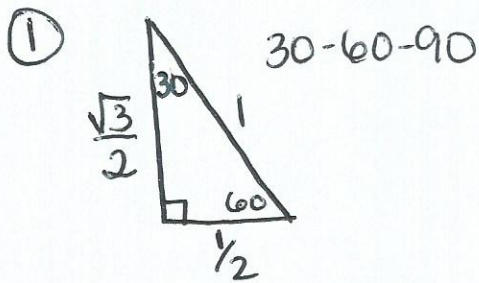


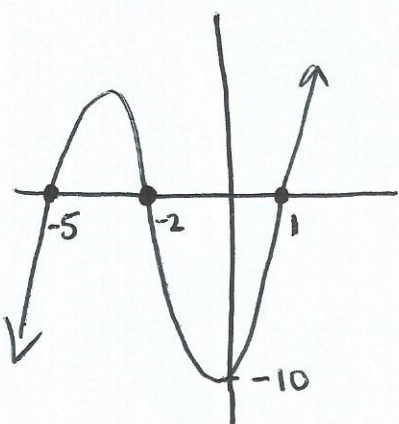
Review #2 Solutions

Alg 2



② Investigate: Graph, Table, Domain, Range, x & y intercepts, Special properties, symmetry

a) $y = x^3 + 6x^2 + 3x - 10$

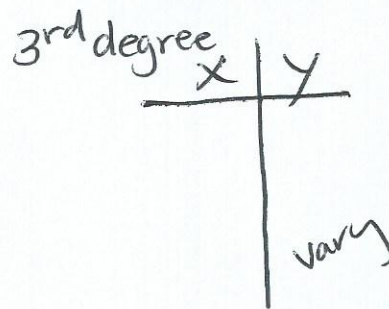


$$\begin{array}{r|rrrr} -2 & 1 & 6 & 3 & -10 \\ & & -2 & -8 & 10 \\ \hline & 1 & 4 & -5 & 0 \end{array}$$

$x^2 + 4x - 5$
 $(x+2)(x+5)(x-1)$

$x = -2 \quad x = -5 \quad x = 1$ zero's

y-int. $(0, -10)$



no symm.

D: All Real #

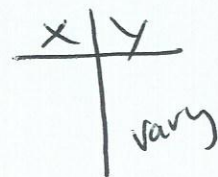
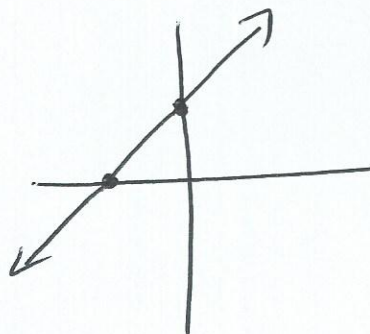
R: All R

b) $y = x - 3 + 5$

$y = x + 2$ linear

y-int
 $(0, 2)$

x-int
 $(-2, 0)$

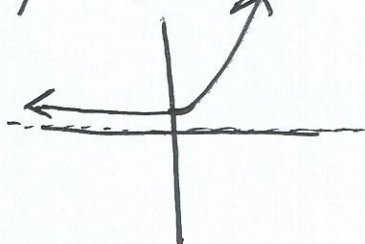


Positive Slope

D: All R

R: All R

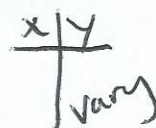
c) $y = 3(2)^x$



Asym: $y = 0$
Growth Exponential

D: All R

R: $y > 0$



y-int $(0, 3)$

no x intercepts

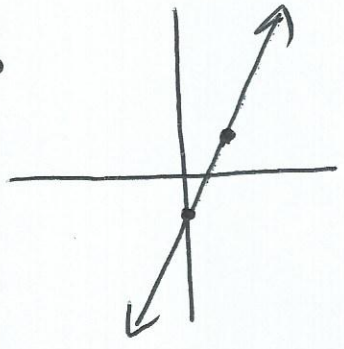
② d) $y = 2(x+1) - 3$ linear

Table
x | y
Vary

$y = 2x + 2 - 3$

$y = 2x - 1$

Positive Slope



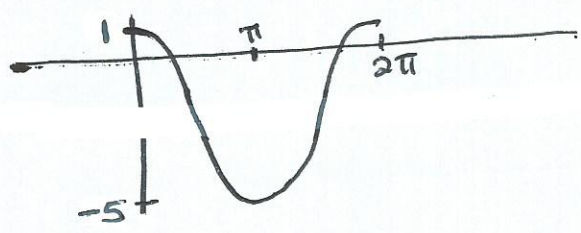
D: All R

R: All R

x-int $(\frac{1}{2}, 0)$

y-int $(0, -1)$

e) $3 \cos x - 2 = y$



Amplitude 3

moved down 2

one cycle 2π

③ a) $|2x+5| = x+4$

$2x+5 = x+4$
-x -5 -x -5

$x = -1$

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

$2x+5 = -x-4$
+x -5 +x -5

~~$3x = -9$~~

~~$x = -3$ test~~

Doesn't work

$|2(-3)+5| = -(-3+4)$

$|-6+5| = -(-1)$
 $|-1| = -(-1)$

$1 \neq -1$

b) $3(x+1)^3 - 1 = 80$

$\frac{3(x+1)^3}{3} = \frac{81}{3}$

$\sqrt[3]{(x+1)^3} = \sqrt[3]{27}$

$x+1 = 3$

$x = 2$

c) $\sqrt{x+7} - x = 1$

$\sqrt{x+7} = (x+1)^2$

$x+7 = x^2 + 2x + 1$
-x -7

$0 = x^2 + x - 6$

$(x+3)(x-2) = 0$

$x = -3$

$x = 2$

$$\textcircled{4} \begin{cases} y = 3x - 1 \\ 2x - 3y = 10 \end{cases} \text{ substitution}$$

$$2x - 3(3x - 1) = 10 \quad y = 3(-1) - 1$$

$$2x - 9x + 3 = 10 \quad y = -3 - 1$$

$$-7x = 7 \quad y = -4$$

$$x = -1$$

$$\textcircled{(-1, -4)}$$

$$\textcircled{5} \text{ a) } d^{-13} = \frac{1}{d^{13}}$$

$$\text{b) } (3xw^4)^{-2}$$

$$3^{-2} x^{-2} w^{-8}$$

$$\frac{1}{9x^2w^8}$$

$$\text{c) } n^3(n^2)^5$$

$$n^3 n^{10}$$

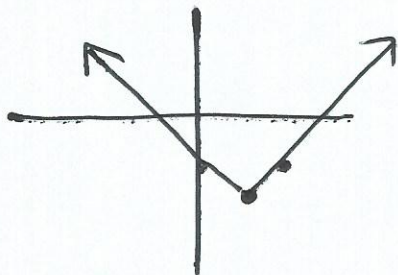
$$\textcircled{n^{13}}$$

$$\text{d) } i^{12} = (i^4)^3 = \textcircled{1}$$

$$\text{e) } (i+2) - 3i + 5$$

$$\textcircled{-2i + 7}$$

$$\textcircled{6} f(x) = |x-1| - 2 \quad v: (1, -2)$$



$$D: \text{All } \mathbb{R}$$

$$R: y \geq -2$$

⑦ a) $-2, 4, 10, 16, \dots$
 $+6$ Arithmetic

$$t(n) = 6n - 8$$

b) $81, 27, 9, 3, \dots$
 $\div 3$ or $\times \frac{1}{3}$ Geometric

$$t(n) = 243 \left(\frac{1}{3}\right)^n$$

⑧ $\frac{x-3y}{4} + 2(x+1) = 7$

4. $\left(\frac{x}{4} - \frac{3}{4}y + 2x + 2 = 7\right)$
 Clear fractions

$$\underline{x} - 3y + \underline{8x} + \underline{8} = \underline{28}$$

$$9x - 3y = 20$$

$$-3y = \frac{-9x + 20}{-3}$$

$$y = \frac{-9x}{-3} + \frac{20}{-3} \quad \text{OR} \quad y = \frac{-9x + 20}{-3}$$

$$y = 3x - \frac{20}{3} \rightarrow$$

⑨ a) $2x^2 - 11x - 21 = (2x + 3)(x - 7)$

b) $x^3 + x^2 - x - 10$ $\begin{array}{r} 2 \mid 1 \quad 1 \quad -1 \quad -10 \\ \underline{2 \quad 6 \quad 10} \\ 1 \quad 3 \quad 5 \quad 0 \end{array}$

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

$$(9) c) 36x^2 - 120x + 100$$

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

$$4(3x - 5)(3x - 5)$$

$$d) -40x^4 - 56x^2$$

$$-8x^2(5x^2 + 7)$$

$$e) x^2 - 4x - 77$$

$$(x - 11)(x + 7)$$

$$(10) a) \frac{x^2 + 6x}{(x+6)^2} \cdot \frac{x^2 + 7x + 6}{x^2 - 1} = \frac{x(x+6)}{(x+6)(x+6)} \cdot \frac{(x+6)(x+1)}{(x+1)(x-1)} = \frac{x}{x-1}$$

$$b) \frac{x^2 - 4x - 5}{x^2 - 4x + 4} \div \frac{x^2 - 2x - 15}{x^2 + 4x - 12} = \frac{(x-5)(x+1)}{(x-2)(x-2)} \cdot \frac{(x+6)(x-2)}{(x-5)(x+3)}$$

$$\frac{(x+1)(x+6)}{(x-2)(x+3)}$$

$$c) \frac{3}{x-1} - \frac{2}{x-2} \quad \text{LCD} \quad (x-1)(x-2)$$

$$\frac{3(x-2)}{(x-1)(x-2)} + \frac{-2(x-1)}{(x-1)(x-2)} \Rightarrow \frac{3x-6-2x+2}{(x-1)(x-2)} \Rightarrow \frac{x-4}{(x-1)(x-2)}$$

$$(11) a) y = x^2 + 8x + 10$$

$$y = (x^2 + 8x + \underline{\quad}) + 10$$

$$y = (x^2 + 8x + 16) + 10 - 16$$

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

$$V: (-4, -6)$$

⑪ b) $y = x^2 + 5x + 7$

$y = (x^2 + 5x \text{ ---}) + 7$

$\left(\frac{5}{2}\right)$

$(x^2 + 5x + \frac{25}{4}) + \frac{28}{4} - \frac{25}{4}$

$y = (x + \frac{5}{2})^2 + \frac{3}{4}$

$V: (-\frac{5}{2}, \frac{3}{4})$

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

$y = 2(x^2 - 3x + \frac{9}{4}) + 2 - \frac{9}{2}$

$y = 2(x - \frac{3}{2})^2 + \frac{4}{2} - \frac{9}{2} \quad V: (\frac{3}{2}, -\frac{5}{2})$

$y = 2(x - \frac{3}{2})^2 - \frac{5}{2}$

⑫ a) $x^2 + 5x + 4 < 0$

$(x + 4)(x + 1)$

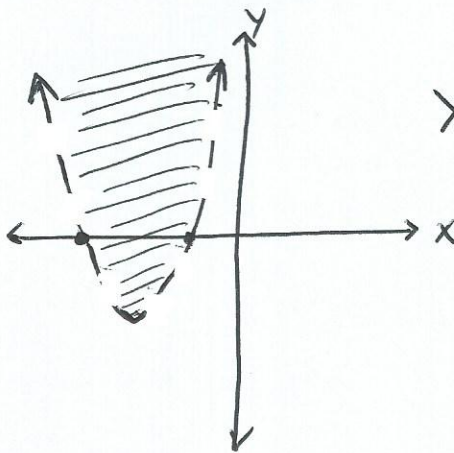
Parabola

Shade inside

$x = 0$

$0^2 + 5(0) + 4 < 0$

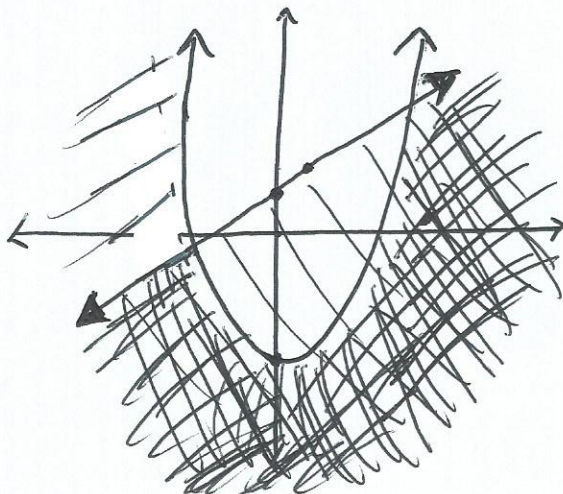
$4 < 0$



X-int $(-4, 0)$

$(-1, 0)$

b) $\begin{cases} y \leq x + 1 \\ y \leq x^2 - 4 \end{cases}$



Test $0 \leq 0 + 1 \quad 0 \leq 1$

$0 \leq 0^2 - 4$

$$(13) y = ab^x$$

$$y = 6.50(1.04)^x$$

$$a) y = 6.50(1.04^{10}) \approx 9.62$$

$$b) y = 6.50(1.04^{-10}) \approx 4.39$$

$$c) 10 = 6.50(1.04)^x$$

$$\frac{10}{6.50} = 1.04^x$$

$$1.5385 = 1.04^x$$

$$\log_{1.04}(1.5385)$$

$$x \approx 10.98$$

$$(14) a) y = 2(x+3)$$

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

$$\frac{x}{2} - 3 = y$$

$$b) y = \frac{1}{2}(x+4)^2 + 1$$

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

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

$$\pm\sqrt{2(x-1)} = y+4$$

$$-4 \pm \sqrt{2(x-1)} = y$$

$$c) y = \sqrt{x-2} + 3$$

$$x = \sqrt{y-2} + 3$$

$$x-3 = \sqrt{y-2}$$

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

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

$$(15) \text{ a) } 3 \log_5(x) + \log_5(x+1)$$

$$\log_5 x^3 + \log_5(x+1)$$

$$\log_5(x^3 \cdot (x+1))$$

$$\text{b) } \frac{\log(90 \cdot 4)}{\log 36} = \log \frac{360}{36} = \log 10$$

$$(16) \text{ a) } \log_2 \frac{x}{3} = 4$$

$$2^4 = \frac{x}{3}$$

$$3 \cdot 16 = \frac{x}{3} \cdot 3$$

$$48 = x$$

$$\text{b) } \log_7(3x-2) = 2$$

$$7^2 = 3x-2$$

$$49 = 3x-2$$

$$51 = 3x$$

$$x = 17$$

$$\text{c) } \frac{24}{x+1} = \frac{16}{3}$$

$$72 = 16(x+1)$$

$$72 = 16x + 16$$

$$56 = 16x$$

$$\frac{56}{16} = x$$

$$\frac{7}{2} = x \quad \text{or } 3.5$$

$$\text{d) } \frac{5}{2x} + \frac{1}{6} = 8 \quad \frac{\text{LCD}}{12x}$$

$$\frac{5 \cdot 6}{12x} + \frac{2x}{12x} = \frac{96x}{12x}$$

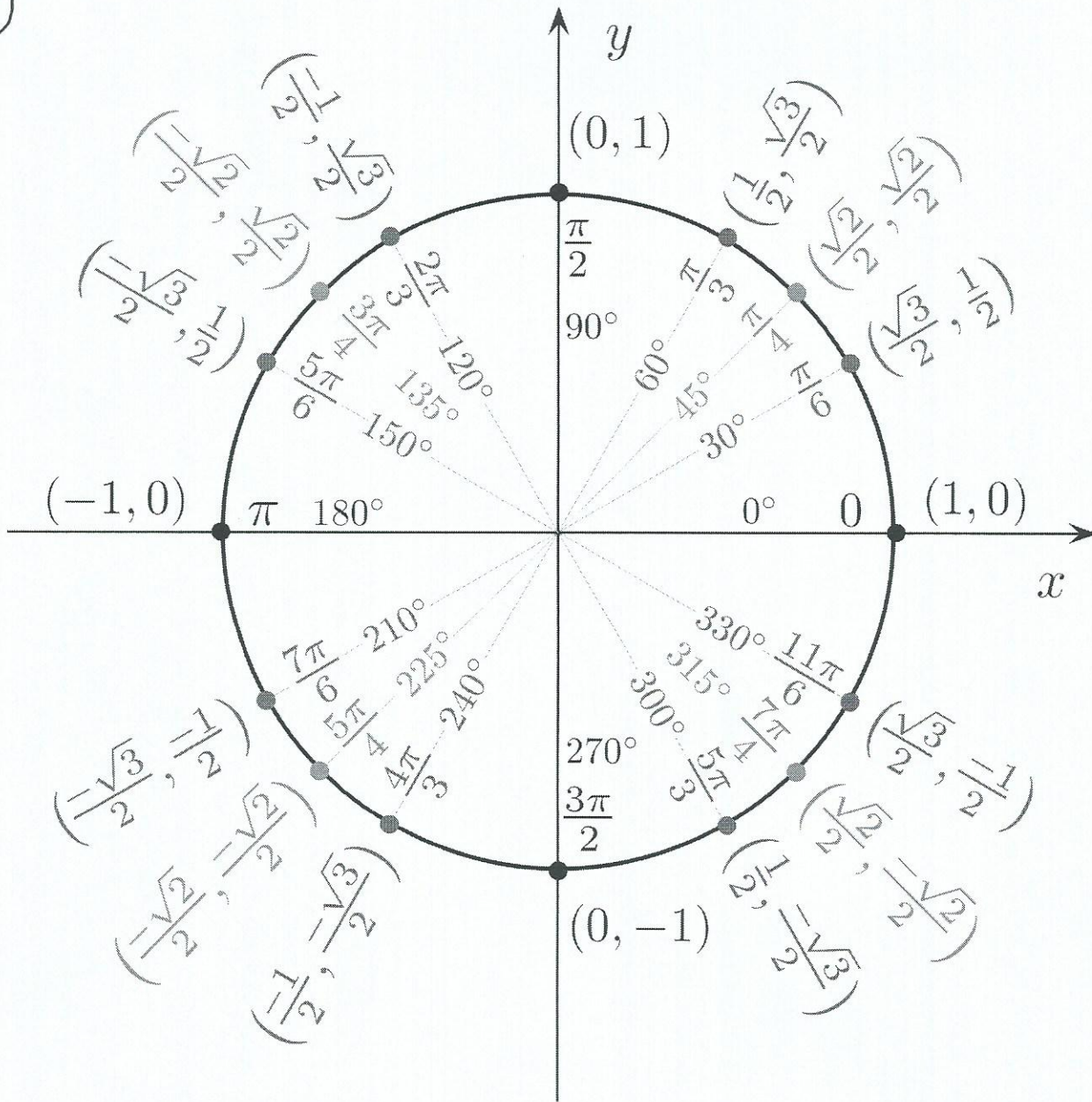
$$30 + 2x = 96x$$

$$30 = 94x$$

$$\frac{30}{94} = x$$

$$\frac{15}{47} = x$$



17



$$(18)^a) y = \sin x$$

$$b) y = \sin(x+3)$$

$$c) y = 5 \sin x$$

(19) Sine starts at zero 
Cosine starts at one 

$$(20) \frac{x}{(2-3i)(2+3i)} = \frac{2x+3xi}{4-9i^2} = \frac{2x+3xi}{4+9} = \frac{2x+3xi}{13}$$

$$(21) 24C_4 = 10626 \quad \frac{24!}{4!(24-4)!}$$

$$(22)^a) y = ax^2 + bx + c$$

$$\begin{cases} -3 = a(9^2) + b(9) + c \\ 3 = a(6^2) + b(6) + c \\ 27 = a(4^2) + b(4) + c \end{cases}$$

$$\begin{cases} -3 = 81a + 9b + c & \textcircled{1} \\ 3 = 36a + 6b + c & \textcircled{2} \\ 27 = 16a + 4b + c & \textcircled{3} \end{cases}$$

$$-1 \cdot \textcircled{1} \quad 3 = -81a - 9b - c$$

$$\textcircled{2} \quad 3 = 36a + 6b + c$$

$$\textcircled{1'} \quad 6 = -45a - 3b$$

$$-1 \cdot \textcircled{2} \quad -3 = -36a - 6b - c$$

$$\textcircled{3} \quad 27 = 16a + 4b + c$$

$$\textcircled{2'} \quad 24 = -20a - 2b$$

$$-2 \cdot \textcircled{1'} \quad -12 = 90a + 6b$$

$$3 \cdot \textcircled{2'} \quad 72 = -60a - 6b$$

$$60 = 30a$$

$$a = 2$$

$$\textcircled{1'} \quad 6 = -45(2) - 3b$$

$$6 = -90 - 3b$$

$$96 = -3b \quad b = 32$$

$$\textcircled{3} \quad 27 = 16(2) + 4(32) + c$$

$$27 = 32 + 128 + c$$

$$-133 = c$$

$$(2, 32, -133)$$

$$y = 2x^2 + 32x - 133$$

$$(22) b) y = ax^2 + bx + c$$

$$\begin{cases} 20 = a(3^2) + b(3) + c \\ 4 = a(-1)^2 + b(-1) + c \\ 4 = a(-5)^2 + b(-5) + c \end{cases}$$

$$\begin{cases} 20 = 9a + 3b + c \quad ① \\ 4 = 1a - 1b + c \quad ② \\ 4 = 25a - 5b + c \quad ③ \end{cases}$$

$$\begin{array}{l} ① \quad 20 = 9a + 3b + c \\ -1 \cdot ② \quad -4 = -1a + 1b - c \\ \hline \end{array}$$

$$①' \quad 16 = 8a + 4b$$

$$-1 \cdot ①' \quad -16 = -8a - 4b$$

$$②' \quad 0 = -24a + 4b$$

$$-16 = -32a$$

$$\frac{1}{2} = a$$

$$② \quad 4 = 1\left(\frac{1}{2}\right) - 1(3) + c$$

$$4 = \frac{1}{2} - 3 + c$$

$$\frac{5}{2} + \frac{8}{2} = \frac{c}{2} + c$$

$$\frac{13}{2} = c$$

$$\begin{array}{l} ② \quad 4 = 1a - 1b + c \\ -1 \cdot ③ \quad -4 = -25a + 5b - c \\ \hline \end{array}$$

$$②' \quad 0 = -24a + 4b$$

$$②' \quad 0 = -24\left(\frac{1}{2}\right) + 4b$$

$$0 = -12 + 4b$$

$$12 = 4b$$

$$3 = b$$

$$\left(\frac{1}{2}, 3, \frac{13}{2}\right)$$

$$y = \frac{1}{2}x^2 + 3x + \frac{13}{2}$$

$$c) \begin{cases} 15 = a(1^2) + b(1) + c \\ 31 = a(3^2) + b(3) + c \\ 6 = a(-2)^2 + b(-2) + c \end{cases}$$

$$\begin{cases} 15 = a + b + c \quad ① \\ 31 = 9a + 3b + c \quad ② \\ 6 = 4a - 2b + c \quad ③ \end{cases}$$

$$\begin{array}{l} ① \quad 15 = a + b + c \\ -1 \cdot ② \quad -31 = -9a - 3b - c \\ \hline \end{array}$$

$$①' \quad -16 = -8a - 2b$$

$$5 \cdot ①' \quad -80 = -40a - 10b$$

$$\begin{array}{l} 2 \cdot ②' \quad 50 = 10a + 10b \\ -30 = 30a \quad a = -1 \end{array}$$

$$\begin{array}{l} ② \quad 31 = 9a + 3b + c \\ -1 \cdot ③ \quad -6 = -4a + 2b - c \\ \hline \end{array}$$

$$②' \quad 25 = 5a + 5b$$

$$②' \quad 25 = 5(-1) + 5b$$

$$\begin{array}{l} 30 = 5b \\ b = 6 \end{array}$$

$$\begin{array}{l} ① \quad 15 = -1 + 6 + c \\ -5 \\ 10 = c \end{array}$$

$$y = -1x^2 + 6x + 10$$

$$(23) \quad 52 P_3 = \frac{52!}{(52-3)!} = 132,600$$

$$(24) \quad 5 \cdot 6 \cdot 22 = 660 \text{ ways for 1 topping each category}$$

$$5^C_3 \cdot 6^C_3 \cdot 22^C_3 \text{ Choosing 3 from each}$$

$$10 \cdot 20 \cdot 1540 = 308,000 \text{ ways}$$

$$(25) \quad 18^C_{11} = 31,824 \text{ unique teams}$$

Position will change the team and order will matter. Left back for example is different than center forward.