Problem 1.

\[
3 \leq \frac{-2x-3}{5} < 7 \quad \Rightarrow \quad (3 \times 5) \leq (-\frac{2x-3}{5}) \times 5 < (7 \times 5) \quad \Rightarrow \quad 15 \leq -2x - 3 < 35 \quad \Rightarrow \quad 15 + 3 \leq -2x - 3 + 3 < 35 + 3 \quad \Rightarrow \quad 18 \leq -2x < 38 \quad \Rightarrow \quad (-2) \geq \frac{-2x}{(-2)} > \frac{38}{(-2)} \quad \Rightarrow \quad -9 \geq x > -19 \quad \Rightarrow \quad x \in (-19, -9].
\]

Problem 2.

\[
CD + C = PC + N \quad \Rightarrow \quad CD + C - PC = N \quad \Rightarrow \quad C(D + 1 - P) = N \quad \Rightarrow \quad C = \frac{N}{D+1-P}.
\]

Problem 3.

(a) \(-2x + 5y + 3 = 0 \quad \Rightarrow \quad 5y + 3 = 2x \quad \Rightarrow \quad 5y = 2x - 3 \quad \Rightarrow \quad y = \frac{2x-3}{5} = \frac{2}{5}x - \frac{3}{5} \quad \Rightarrow \quad m = \frac{2}{5}.
\]

(b) \(x=4\). Slope is not defined.

Problem 4.

Step 1. Find \(f(a + h)\).

\[
f(a + h) = 2(a + h)^2 - 3(a + h) + 6 = 2a^2 + 4ah + 2h^2 - 3a - 3h + 6
\]

Step 2. Find \(f(a + h) - f(a)\).

\[
f(a + h) - f(a) = [2a^2 + 4ah + 2h^2 - 3a - 3h + 6] - [2a^2 - 3a + 6]
= 2a^2 + 4ah + 2h^2 - 3a - 3h + 6 - 2a^2 + 3a - 6
= 4ah + 2h^2 - 3h = h(4a + 2h - 3)
\]

Step 3. Find \(\frac{f(a+h)-f(a)}{h}\).

\[
\frac{f(a+h)-f(a)}{h} = \frac{h(4a+2h-3)}{h} = 4a + 2h - 3
\]

Problem 5. Let \(x\) be number of produced cards. Then income would be \(I = 5.75x\).

And Cost=Fixed cost + variable cost=480 + 1.75x.

We want to have break even, i.e. \(5.75x = 480 + 1.75x\).

Solve for \(x\): \(5.75x - 1.75x = 480 \Rightarrow 4x = 480 \Rightarrow x = 120\).

Problem 6. \(P_1 = (-1, 4)\) and \(P_2 = (5, -1)\). Therefore, \(m = \frac{y_2-y_1}{x_2-x_1} = \frac{-1-4}{5-(-1)} = -\frac{5}{6}\).

\[
y-y_1 = mx-x_1 \Rightarrow y-4 = -\frac{5}{6}(x-(-1)) \Rightarrow y-4 = -\frac{5}{6}[x+1] \Rightarrow y-4 = \frac{-5}{6}x - \frac{5}{6} \Rightarrow y = \frac{-5}{6}x - \frac{5}{6} + 4 \Rightarrow y = \frac{-5}{6}x + \frac{19}{6}.
\]
Problem 7. We can see the line passes through points $P_1 = (0, -1)$ and $P_2 = (-3, 0)$. Therefore, the slope is given by $m = \frac{0 - (-1)}{-3 - 0} = \frac{1}{3}$. Then we can use $y - y_1 = m(x - x_1)$.

$$y - (-1) = \frac{1}{3}(x - 0) \rightarrow y = -\frac{1}{3}x - 1 \rightarrow \frac{1}{3}x + y = -1.$$  
Problem 8.

$$8 - 2x > 0 \rightarrow 8 > 2x \rightarrow 4 > x \rightarrow D = (-\infty, 4)$$

Problem 9.

(a) $f(x) = \sqrt{x}$
(b) Correct order 1: Strect, shift to left, shift down.
   Correct order 2: Shift to the left, strect, shift down.
   Correct order 3: Strect, shift down, Shift to the left.
   Wrong Order: Any order that strech is done after shifting down.

![Graph of a curve](image)

it can be seen from formula and graph that (-2,-1) is one of the points. and $x$-intercept is $(-7/4, 0)$.

Problem 10.
Problem 11.
(a) \( f(x) = 2x^2 - 12x + 10 = 2(x^2 - 6x) + 10 = 2[(x - 3)^2 - 9] + 10 = 2(x - 3)^2 - 18 + 10 = 2(x - 3)^2 - 8. \)
(b) \( P = (3, -8). \) It is minimum.
(c) \( x = 3. \)
(d) To find \( x \)-intercept let \( y = 0 \). Hence, \( 2(x - 3)^2 - 8 = 0 \implies 2(x - 3)^2 = 8 \implies (x - 3)^2 = 4 \implies x - 3 = \pm 2 \implies x = 3 \pm 2 \implies x = 1 \) or \( x = 5 \).
(e) \( R = [-8, \infty) \)
(f)

![Graph](image.png)

Problem 12. \( f(x) = -(x - 4)^2 + 2 = -x^2 + 8x - 14. \)

Problem 13. Degree of polynomial is sum of largest degrees in each parenthesis. So, degree is 2 + 4 + 1 = 7.

To find \( x \)-intercept let \( y = 0 \). Therefore, \( -(x^2 - 9)(x^4 + 1)(3x - 2) = 0. \)
Product of different numbers is zero means at least one of those numbers is zero. Therefore,

\[
(x^2 - 9) = 0 \text{ OR } (x^4 + 1) = 0 \text{ OR } (3x - 2) = 0
\]

\[
x^2 = 9 \text{ OR } 3x = 2
\]

\[
x = \pm 3 \text{ OR } x = 2/3
\]
To find \( y - \text{intercept} \) let \( x = 0 \), therefore, \( f(0) = -(0 - 9)(0 + 1)(0 - 2) = -18. \)

Problem 14.
(a) \( 9x^2 = 9x + 2 \implies x^2 = x + 2 \implies x^2 - x - 2 = 0 \implies (x - 2)(x + 1) = 0 \implies x = 2 \) or \( x = -1. \)

Or you can use \( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \) Or you can complete the square, write it in vertex form, and solve the resulting equation for \( x. \)

(b) \( (x^2 - 1)^3 = (2x - 1)^5 \implies (x^2 - 1) = (2x - 1) \implies x^2 - 1 - 2x + 1 = 0 \implies x^2 - 2x = 0 \implies x(x - 2) = 0 \implies x = 0 \) or \( x = 2. \)
Problem 15.
(a) Minimum degree = # of vertices +1 = 4+1=5.
(b) Negative.

Problem 16.
(a) Denominator cannot be zero. Therefore, \(x^2 - 2x - 3 \neq 0 \implies (x - 3)(x + 1) \neq 0\)
\[\implies x \neq 3 \text{ and } x \neq -1.\]
Therefore, \(D_f = \mathbb{R} \setminus \{ -1, 3 \} \).

(b) Vertical Asymptotes are roots of denominator that are not roots of numerator. Therefore, \(x = 3\) is the only V.A. OR you can simplify numerator and denominator, then find roots of denominator as V.A. :
\[
f(x) = \frac{2x^2 - 2}{x^2 - 2x - 3} = \frac{2(x^2 - 1)}{(x - 3)(x + 1)} = \frac{2(x - 1)(x + 1)}{(x - 3)(x + 1)} = \frac{2(x - 1)}{x - 3}
\]

(c) Since degree of numerator and denominator are both 2, i.e. their degree is the same, horizontal asymptote is \(y = \frac{2}{1} = 2\).

Problem 17.
Vertical Asymptote is \(x = 2\), Horizontal asymptote is \(y = 3\).
To find \(x\) - intercept let \(y = 0 \implies \frac{3x + 5}{x - 2} = 0 \implies 3x + 5 = 0 \implies x = -5/3.\)
To find \(y\) - intercept let \(x = 0 \implies f(0) = (0 + 5)/(0 - 2) = -5/2.\)

Problem 18.
(a) V.A’s are roots of denominator that are not roots of numerator, therefore, \(x = -2\) and \(x = -3/2\) and \(x = 5\) are all V.As
H.A is \(y = 0\) since degree of denominator is greater than degree of numerator.

(b) \(x = 3\) and \(x = 5/2\) are both V.A.
Since degree of numerator and denominator is the same H.A. is \(y = 1/2.\)

(c) \(x = -7\) and \(x = -4/3\) and \(x = 5\) are V.A.
There is no H.A.