Question	answer
1	D
2	B
3	C
4	
5	
6	
7	D
8	A
9	C
10	A
11	D
12	B
13	B
14	E
15	D
16	C
17	E
18	D

Question 19 **Question 1: a)**

$$x = 29 \pmod{39}$$

b)

No solutions as 22 id not divisible by 3

Question 20 **Question 2: a)**

b)

$$q = 30N$$

Question 21 **Question 3: a)**

$$\sinh(5x)\cosh(3x) = \frac{1}{2}\left(\sinh(8x) + \sinh(2x)\right)$$

Given

$$\sinh(5x - 3x) = \sinh(2x) = \sinh(5x)\cosh(3x) - \cosh(5x)\sinh(3x)$$

and

$$\sinh(5x + 3x) = \sinh(8x) = \sinh(5x)\cosh(3x) + \cosh(5x)\sinh(3x)$$

we can write

$$\begin{aligned}\sinh(8x) + \sinh(2x) &= 2\left[\sinh(5x)\cosh(3x)\right] - \cosh(5x)\sinh(3x) + \cosh(5x)\sinh(3x)\\ &= 2\sinh(5x)\cosh(3x)\end{aligned}$$

Thus, we have

$$\sinh(5x)\cosh(3x) = \frac{1}{2}\left(\sinh(8x) + \sinh(2x)\right)$$

as required.

b)

$$\begin{aligned}\int \sinh(5x)\cosh(3x)\,\mathrm{d}x &= \int \frac{1}{2}\left(\sinh(8x) + \sinh(2x)\right)\mathrm{d}x\\ &= \frac{1}{2}\left(\int \sinh(8x)\,\mathrm{d}x + \int \sinh(2x)\,\mathrm{d}x\right)\\ &= \frac{1}{2}\left(\frac{1}{8}\cosh(8x) + \frac{1}{2}\cosh(2x)\right) + C\\ &= \frac{1}{16}\cosh(8x) + \frac{1}{4}\cosh(2x) + C\end{aligned}$$