**Question 1 (Transformations of Graphs - Descriptions)**

|  |  |
| --- | --- |
| Comparing with    ***Alternatively*,** |  |

**Question 2 (System of Linear Equations)**

|  |  |
| --- | --- |
| Let $*x*, $*y* and $*z* be the cost of a chocolate bar, a bag of gummy bears and a lollipop respectively.    From GC,  The cost of a chocolate bar, a bag of gummy bears and a lollipop is $2.70, $6.80 and $1.20 respectively. |  |

**Question 3 (Transformations of Graphs - Sketching)**

|  |  |
| --- | --- |
| **(a)**  **G:\2021\Math\Acads\1MA2\02 Assessments\05 T4PE\Whiteboard 17 1.jpg** |  |
| G:\2021\Math\Acads\1MA2\02 Assessments\05 T4PE\Whiteboard 17 2.jpg**(b)** |  |

**Question 4 (Inequalities)**

|  |  |
| --- | --- |
| **(i)**               |  |
| **(ii)** Replacing *x* with  in the original inequality,    Thus, from the first part, |  |

**Question 5 (Functions)**

|  |  |
| --- | --- |
| **(i)** |  |
| **(ii)** |  |
| **(iii)** When , . This corresponds to  *y*  *x*  .  When , . This corresponds to  .  Therefore, |  |

**Question 6 (Parametric Curves)**

|  |  |
| --- | --- |
| **(i)** For  when    Therefore, |  |
| **(ii)**        Substituting (4) into (3), |  |

**Question 7 (Practical Problems involving Differentiation)**

|  |  |
| --- | --- |
| **(i)** |  |
| **(ii)**                  Thus, *A* is a maximum when |  |

|  |  |
| --- | --- |
| **(iii)** Let the volume of water in the container be *V*          *h* is increasing at a rate of 0.637 or |  |

**Question 8 (Applications of Integration)**

|  |  |
| --- | --- |
| **(a)** Area of the bounded region |  |
| **(b)** When  Volume of solid formed |  |

**Question 9 (Vectors I)**

|  |  |
| --- | --- |
| **(i)**    Therefore, area of triangle *ABC* |  |
| **(ii)**    Since the area of triangle *ABC* is  square units,    Therefore,  or |  |

|  |  |
| --- | --- |
| **(iii)**  For  For  Therefore,  is the only possible case for the angle between **u** and **v** to be acute. Let this angle be *θ*. |  |

**Question 10 (Curve Sketching)**

|  |  |
| --- | --- |
| **(i), (iv)** |  |
| **(ii)** At the stationary points of    Thus, for  to have 2 turning points, |  |
| **(iii)**  is a hyperbola with vertices lying on the horizontal line    Through observation from the sketch in part **(i)**, we see that the only way for the two curves to have no point of intersection is for both curves to share the same asymptote with positive gradient. Thus the oblique asymptote of  with positive gradient is    Hence,  Alternatively, sub  into the equation to obtain |  |

**Question 11 (Integration Techniques)**

|  |  |
| --- | --- |
| **(a)** |  |
| **(b)** |  |

|  |  |
| --- | --- |
| **(c)** |  |

**Question 12 (Vectors II)**

|  |  |
| --- | --- |
| **(i)** Let the plane that contains the top of the prism be    Thus, a vector normal to  is  Hence a Cartesian equation of  is |  |
| **(ii)** Since *Q* lies on *l*,  for some  Since *Q* lies on    Therefore,  Therefore, the coordinates of *Q* are |  |
| **(iii)**  Thus  is a normal vector to the plane *PQR*.  Therefore, |  |
| **(iv)** |  |
| **(v)** The thickness of prism is the length of projection of *QR* onto the normal. Therefore,    ***Alternatively,*** |  |