**Chapter 9 TEST**

**Calculator Part**

**Problem**

 **1.** The population, *P*, in thousands, of a small town is modelled by the function , where *t* is time, in years, since the start of 1990.

**a)** Determine the domain and determine with your calculator if the population is increasing or decreasing. Justify your answer by drawing a rough shape of the graph on the domain. [2]

**b)** The town will need its own transit system if the population exceeds 50 000. Will the town’s population ever exceed 50 000? Justify your answer. [1]

 **2.** Solve. $\frac{x}{2x+5}+2x=\frac{8x+15}{4x+10}$ [3]

**Chapter 9 TEST**

**No Calculator Part**

**Multiple Choice [6]**

*Identify the choice that best completes the statement or answers the question.*

**\_\_\_\_ 3.** Which of the reciprocal functions has a vertical asymptote with equation ?

|  |  |  |  |
| --- | --- | --- | --- |
| **A.** |  | **C.** |  |
| **B.** |  | **D.** |  |

**\_\_\_\_ 4.** What is true about the behaviour of the function  as   (right to left)?

|  |  |  |  |
| --- | --- | --- | --- |
| **A.** |  | **C.** |  |
| **B.** |  | **D.** | *f*(*x*) is undefined |

**\_\_\_\_ 5.** What is the *x*-intercept of ?

|  |  |  |  |
| --- | --- | --- | --- |
| **A.** | There is no *x*-intercept. | **C.** |  |
| **B.** |  | **D.** | 0 |

**\_\_\_\_ 6.** Which of the following functions has an oblique asymptote when graphed?

|  |  |  |  |
| --- | --- | --- | --- |
| **A.** | $$f\left(x\right)=\frac{5x^{3}-10x^{2}+5}{3x^{2}-x-2}$$ | **C.** | $$f\left(x\right)=\frac{3x^{2}+5x-4}{2x^{3}-x-2}$$ |
| **B.** | $$f\left(x\right)=\frac{5x^{3}-x-2}{x^{3}-1}$$ | **D.** | all of the above |

**\_\_\_\_ 7.** Which function has a *y*-intercept of ?

|  |  |  |  |
| --- | --- | --- | --- |
| **A.** |  | **C.** |  |
| **B.** |  | **D.** | all of the above |

**\_\_\_\_ 8.** Which function has a horizontal asymptote with equation  ?

|  |  |  |  |
| --- | --- | --- | --- |
| **A.** |  | **C.** |  |
| **B.** |  | **D.** |  |

**Short Answer**

 **9. a)** Which rational function has the following characteristics? [2]

• a vertical asymptote with equation 

• a horizontal asymptote with equation 

• a zero when *x* = - 1

• a point of discontinuity at 3

**b)** Write an equation for a rational function whose graph has all of the following features: [2]

• vertical asymptote with equation *x* = 3

• horizontal asymptote with equation *y* = 2

• hole at *x* = 1

• x-intercepts: -1 and 5

 **10.** Consider the function .

**a)** Determine the key features of the function: [4]

domain, *x*-intercepts, *y*-intercepts, vertical and horizontal asymptotes, points of discontinuity…

**b)** Sketch the graph of the function as precisely as possible… [2]


c) Determine the range: [1]

**11.** Write an equation in factored form for the graph of the rational functions shown. [3]
a) b)

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