

Name: \_\_\_\_\_  
Student ID: \_\_\_\_\_

## Test 2

This test is graded out of 46 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

**Formulas:**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\left( \frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right)$$

$$h = \frac{-b}{2a} \quad k = \frac{4ac - b^2}{4a}$$

**Question 1.** (4 marks) Yann buys a laptop for 1700\$ and the laptop is worth 500\$ after 5 years. If the laptop's value depreciates linearly, find the function that describes the depreciation. After what period of time will the laptop be worthless?

**Question 2.** Solve for  $x$

a. (3 marks)  $x^2 - 4x - 3 = 0$

b. (5 marks)

$$\frac{2}{x} + \frac{x}{x-1} = \frac{1}{x-1}$$

**Question 3.** Let  $f(x) = x^2 - 2x + 1$  and  $g(x) = \frac{1}{2x+1}$ .

- a. (1 mark) Evaluate  $g(3)$ .
- b. (2 marks) Evaluate  $f(x+h)$  and simplify.
- c. (2 marks) Simplify  $\frac{f(x+h)-f(x)}{h}$ .
- d. (2 marks) Evaluate  $(g \circ f)(x)$ .
- e. (1 mark) Evaluate  $(g \circ f)(-1)$ .
- f. (bonus 1 mark) Determine the domain of  $g(x)$ .

**Question 4.** The 'Clever Company' company make t-shirts with the slogan "Mathemagical". They sell the t-shirt to the hipsters for 30\$ each. The fixed cost for making the t-shirts is 140\$ and the variable cost is 20\$ for each t-shirt (*since the t-shirts are fairtrade*).

- a. (1 mark) Determine the revenue function,  $R(x)$ .
- b. (1 mark) Determine the cost function,  $C(x)$ .
- c. (2 marks) Determine the profit function,  $P(x)$ .
- d. (3 marks) Determine the break-even point and discuss its meaning.
- e. (bonus 1 mark) Determine the marginal cost and discuss its meaning.

**Question 5.** Brittany and Giuseppe have determined the demand and supply function for the t-shirts sold by the 'Clever Company', while playing cards at the back of their class: demand:  $2p + 9q = 300$   
supply:  $2p - q = 20$

- a. (4 marks) Determine the market equilibrium.
- b. (1 mark) Determine the  $q$  and  $p$  intercepts of the demand function.
- c. (1 mark) Determine the  $q$  and  $p$  intercepts of the supply function.
- d. (3 marks) Sketch the graph of the demand, supply function and label the market equilibrium.

**Question 6.** Let  $f(x) = x^2 - 4x + 3$  be a quadratic function.

- a. (3 marks) Determine the vertex of  $f(x)$ .
- b. (1 mark) Determine the orientation of the parabola and state whether the vertex is a minimum or maximum.
- c. (1 mark) Determine the  $y$ -intercept.
- d. (3 marks) Determine the  $x$ -intercept(s).
- e. (2 marks) Sketch the graph of  $f(x)$ .
- f. (bonus 1 mark) Determine the range of  $f(x)$ .