

MTH 138 Practice Quiz #5

Name \_\_\_\_\_ Row \_\_\_\_\_

Show Essential work. Note that these sample questions are presented primarily for the purpose of helping you solidify the acquired concepts on related topics. The questions on the actual quiz may differ in type and format.

(1) Solve for  $x$ :  $(x - 10)^2(5 + x)(4 - x)^2 > 0$

(2) If the graph of  $f(x)$  is  with domain  $[-2, 1]$

(i) sketch the graph of  $g(x) = -2f(x + 1) - 1$

(ii) sketch the graph of  $h(x) = -f(-x)$

(iii) sketch the graph of  $k(x) = f(2x)$

(3) Sketch the graph of  $f(x) = \begin{cases} x+1 & \text{if } x < -1 \\ 3 & \text{if } -1 \leq x < 1 \\ x^2 & \text{if } x \geq 1 \end{cases}$

(4) Find the vertex of the parabola representing the function  $f(x) = 2x^2 - 8x + 5$ . Sketch this parabola.

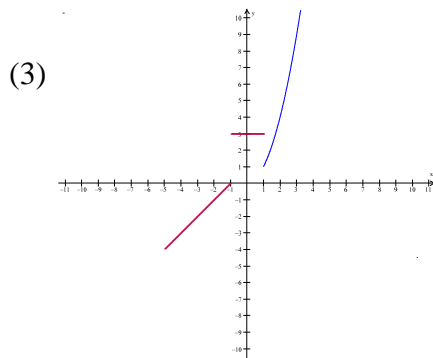
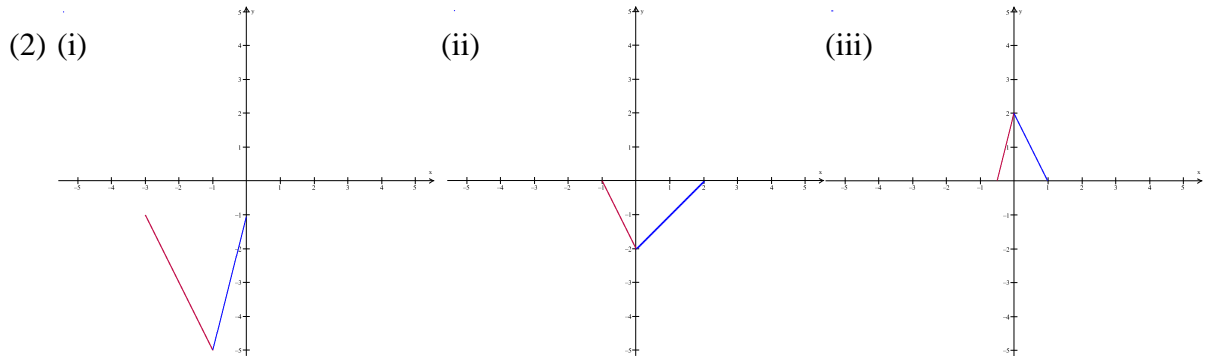
(5) (i) Does the function  $f(x) = -x^2 - 8x + 10$  have a maximum value? If yes, determine this maximum value.

(ii) Does the function  $f(x) = -x^2 - 8x - 10$  have a minimum value? If yes, determine this minimum value.

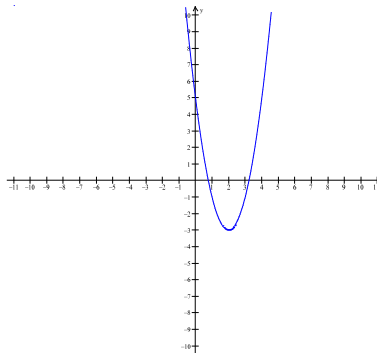
(6) Find the function  $f(x) = a(x - h)^2 + k$  for some real numbers  $a$ ,  $h$ , and  $k$  if the graph (parabola) of this function has its vertex at  $(1, 2)$  and passes through another point  $(3, 5)$ .

Answers.

(1)  $-5 < x < 4$  or  $4 < x < 10$  or  $10 < x \Leftrightarrow (-5, 4) \cup (4, 10) \cup (10, \infty)$



(4)  $V(2, -3)$



- (5) (i) Because the parabola opens downward (the leading coefficient is negative), it has a maximum value at the vertex which is at  $x = -4$ . The maximum value  $= f(-4) = 6$ .  
(ii) Because the parabola opens downward (the leading coefficient is negative), it has no minimum value.

(6)  $f(x) = \frac{3}{4}(x-1)^2 + 2$