First Midterm Exam for Econ 1530 Section C
York University
11 October 2005

First name:

Last name:

SID number:

Instructions: Write your name and SID number above; circle your answer below, *and* fill out the same answer on the bubble sheet (as well as SID number and name).

Problem 1. A quantity grows by 5% per year (with annual compounding). After 10 years the quantity has increased to approximately 100. What was the initial quantity?
(a) 162.89
(b) 105.11
(c) 61.39
(d) 10.5

Problem 2. The expression $xy \left(\frac{ax}{y} + \frac{by}{x} - 2\sqrt{ab} \right)$ can be written as which of the following?
(a) $\left(\sqrt{a}x + \sqrt{b}y \right)^2$
(b) $\left(\sqrt{a}x - \sqrt{b}y \right) \left(\sqrt{a}x + \sqrt{b}y \right)$
(c) $(ax - by)^2$
(d) none of the above

Problem 3. If $a > 0$ and $b > 0$, which of these inequalities must be true?
(a) $-a^2 > ab$
(b) $(-b)^2 > -ab$
(c) $b - a > 0$
(d) none of the above

Problem 4. Find the solution(s) to the equation $2x^2 - 2x - 4 = 0$.
(a) $x_1 = -1$ and $x_2 = 2$
(b) $x_1 = 0$ and $x_2 = 1$
(c) $x = 2$ only
(d) none of the above

Problem 5. Let the mean of a population be $\mu_x = \frac{1}{T}\sum_{i=1}^{T} x_i$, and the mean square deviation be $D = \frac{1}{T}\sum_{i=1}^{T}(x_i - \mu_x)^2$. Then D equals:

(a) $\frac{1}{T}\left(\sum_{i=1}^{T} x_i^2\right) - \mu_x^2$

(b) $\left(\sum_{i=1}^{T} x_i^2\right) - T\mu_x^2$

(c) $\frac{1}{T}\left[\sum_{i=1}^{T}(\mu_x - x_i)\right] - \mu_x$

(d) $\left(\sum_{i=1}^{T} x_i^2\right) + \mu_x^2$

Problem 6. Let $f(x) = \frac{(x-1)^2}{x}$. Which of the below is true?
(a) $f(-1) = -4$
(b) $f(-1) = 4$
(c) $f(-1) = 0$
(d) $f(x)$ is not defined for $x = -1$

Problem 7. The graph of the linear function $f(x)$ passes through the points
$(x_1, y_1) = (\alpha, 1 + 2\alpha)$ and $(x_2, y_2) = (\alpha - 1, 2\alpha - 1)$. Which is the function?
(a) $f(x) = 1 - 2x$
(b) $f(x) = 2 + \alpha x$
(c) $f(x) = 1 + 2x$
(d) $f(x) = \alpha - (1 - \alpha)x$

Problem 8. Figure 1 shows the graph of $y = ax^2 + bx + c$. Which of the following is true according to the figure?
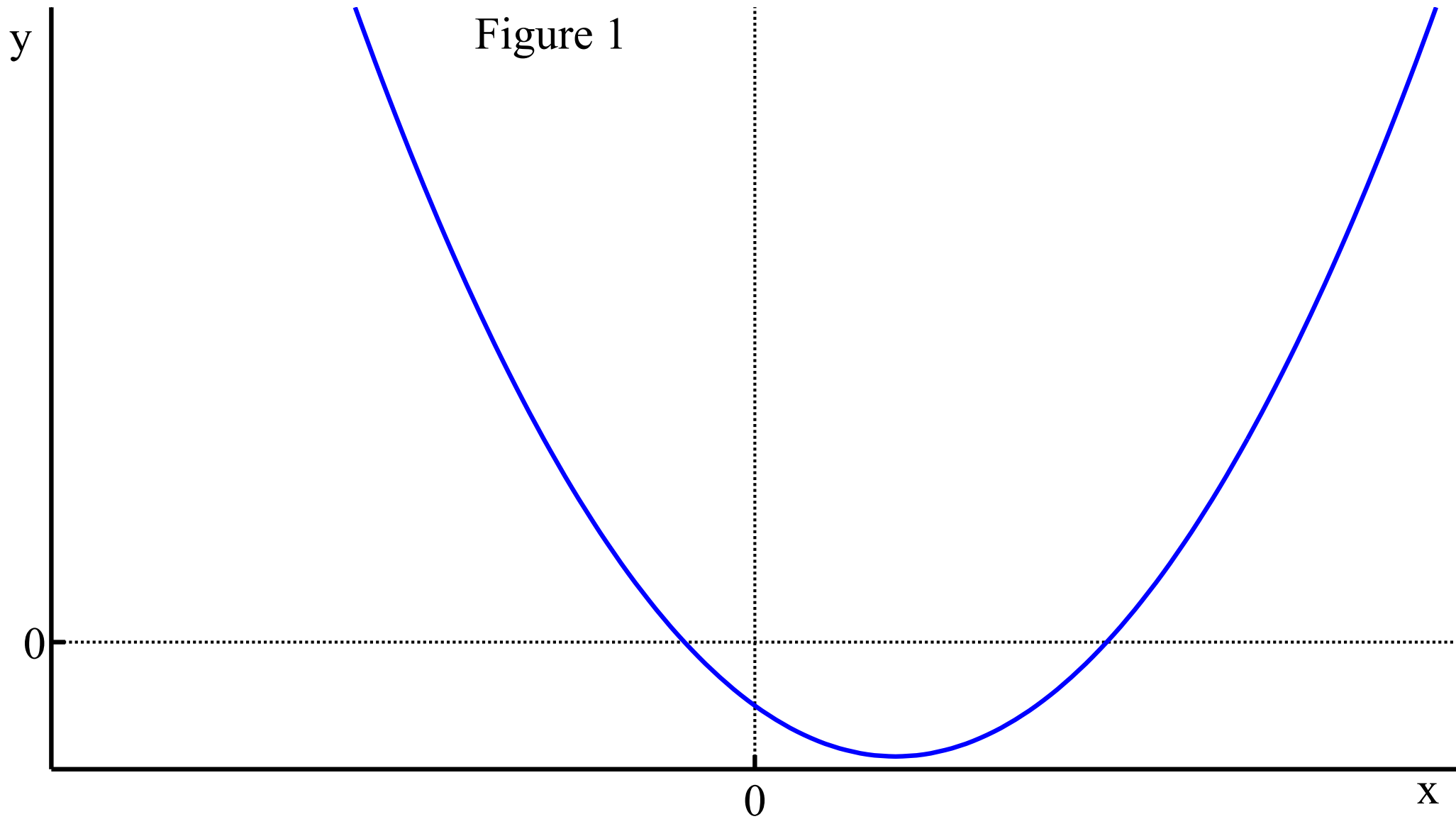(a) $b^2 > 4ac$, $a > 0$, and $b < 0$
(b) $b^2 < 4ac$, $a > 0$, and $b < 0$
(c) $b^2 > 4ac$, $a < 0$, and $b < 0$
(d) $b^2 > 4ac$, $a > 0$, and $b > 0$

Problem 9: Consider the two functions $y = 10 - 2x$ and $y = x - 2$. Which is the y-coordinate of the point where the graphs of these two functions intersect?
(a) -2
(b) 0
(c) 2
(d) 4

Problem 10: Which of the below equals $\ln(Ax^{1-\alpha}) - \ln(A^\alpha)$?
(a) A
(b) $e^{(1-\alpha)}Ax$
(c) $(1 - \alpha)\ln(xA)$
(d) none of the above

Figure 1

Solutions

Problem 1: (c)

Problem 2: (d) It can be written as $\left(\sqrt{a}x - \sqrt{b}y\right)^2$

Problem 3: (b)

Problem 4: (a)

Problem 5: (a)

Problem 6: (a)

Problem 7: (c)

Problem 8: (a) The graph intersects the x-axis twice so there are two real roots: $b^2 > 4ac$; the graph is $\cup$-shaped so $a > 0$; and the x-coordinate of the vertex (the minimum) equals $-b/(2a) > 0$, implying that $b < 0$ (since $a > 0$).

Problem 9: (c)

Problem 10: (c)