Fall 2018 October 22, 2018

Math 101, Midterm 1: 100 minutes

Instructions: There are 5 questions ☺ in this exam. Please inspect the exam and make sure you have all 5 pages of questions. There are 20 extra points, so select the questions that seem easier to you. **Show your work** on the empty space below the questions and on the back pages, if necessary.

Extremely Important:
You *MUST* write all answers in THE SPACE PROVIDED FOR ANSWERS.
Any answers not written in the space provided will NOT BE EVALUATED.
All interest rates must be given as a percentage, with two digits after the decimal point.

Remember: ***You must show your work to get proper credit.***

Academic Honesty Code: Koç University Academic Honesty Code stipulates that "copying from others or providing answers or information, written or oral, to others is cheating." By taking this exam, you are assuming full responsibility for observing the Academic Honesty Code.

NAME: _____ SECTION(Circle one): 1 2 3 4

Q.1:	/25
Q.2:	/15
Q.3:	/30
Q.4:	/20
Q.5:	/30
Total:	/100

Note: Write your name clearly

Question 1:

Let $f(x) = \pi x^2 + 9x + e$. Use two digits after the decimal point for all answers below.

a) Find the coefficients of the vertex form $f(x) = a(x+h)^2 + k$ in terms of π and e:

a = _____ , h = _____ , k = _____

b) Find all intercepts (where the graph of the function crosses the axes) of f. Express the answers as decimal numbers, and use and three digits after the decimal point.

_____ , _____ , and _____

c) What is the range of f?

_____

d) For what values of x will f be negative ?

_____

Question 2:

a)The first step to solve the inequality $||x-2|-1| > 3$ is shown below. Fill in the blanks and circle **one** of the two words 'and' and 'or'.

_____ > _____ and / or _____ < _____

Write the solution using **either** (i) or (ii):

(i) _____ < x < _____ ;

(ii) x > _____ ; x < _____

Question 3:

The function $f(x)$ consists of:

1) The segment of the function $y = \log_b x$ beween the points (1,0) and (3,2)
2) The segment of the parabola with vertex (6,4), starting at (3,2), and ending on the x-axis.
3) $f(x) = 0$ for all x that are outside the domains of (1) and (2).

(segment: parçası, bölümü, kısmı)

a) In the space below, show that ***b***, the base of the log function, is $\sqrt{3}$:

b) Find a, h, k in the equation of the parabola, $y = a(x-h)^2 + k$.

a = _____ , *k* = _____ , *h* = _____

c) Consider the graph of $g(x) = -2f(2x+2) + 2$, obtained by shifting and scaling the function $f(x)$. What are the coordinates of the points on the graph of $g(x)$ corresponding to the points $(2, f(2))$, and $(4, f(4))$? Use three digits after the decimal point for numbers that are not integers.

(_____ , _____) and (_____ , _____)

d) Where does the logarithmic part of $g(x)$ cross the x-axis? Use three digits after the decimal point if the number is not an integer.

x = _____

Question 4:

Solve the following equation for x: $(\ln(x))^2 - \ln(x^3) + 2 = 0$. Give your solutions with two digits after the decimal point. Write your solutions in the space provided below.

_____

Question 5:

Vulture Bank uses a *28% (nominal) annual interest rate* for the situations in (a) to (f):

a) An initial deposit is made into an account with simple interest. 1,400TL is in the account after 6 quarters. The initial deposit is

P = _____ TL

b) An initial deposit is made into an account which is compounded quarterly. 1,400TL is in the account after 5 quarters. The initial deposit is

P = _____ TL

c) An initial deposit is made into an account which is compounded continuously. 1,400TL is in the account after 5 quarters. The initial deposit is

P = _____ TL

d) What is the APY for each of the three cases above?

(i) APY = _____ , (ii) APY = _____ , (iii) APY = _____

e) It is required that an initial deposit of 1000TL into a monthly compounded account should exceed 2000 TL in **n** months. (It does not exceed 2000TL after (**n** -1) months).

n = _____

f) You want to borrow 100,000TL from Vulture bank, to be repaid with monthly payments. You offer to make payments of 2,000TL per month to pay off the loan. Why are the bank officials laughing? (Hint: How long would it take you to pay back the loan in this case?)