This is a closed-bottlesf not tool of not tool of the closef, 程 tablets, no computers (of any kind) allowed.

Duration of the test

AM to noon).

Do **NOT** turn this

are **TOLD** to start.

Answer <u>ALL</u> Quest

provided. Write your answers

Please fill-in ALL the information requested on the front cover of EACH test booklet that you use.

deschat: cstutores you have all 4 pages. The test consists of 4

The test consists of 4 questions. Answer all 4 questions. The mark for each question is listed at the start of Aestsitginment Project Exam Help

The test was written with the intention that you would have ample time to complete it. You will be rewarded for concise well-thought-out answers, rather than long rambling ones. We seek quality rather than a site of the seek quality rathe

Moreover, an answer that contains relevant and correct information as well as irrelevant or incorrect information will be awarded fever practise than one that contains the same relevant and correct information only

Write her by: Whendable snevernare worthless.

1. [5 marks: 1 mark for each answer] Consider a floating point number system with parameters 3.1 = -10 and U=+10 that uses the round-to-nearest rounding rule and allows gradual underflow to subnormal numbers as well as underflow to zero. That is, the numbers in the system include zero ar \blacksquare of the form $\pm d_1.d_2d_3 \cdot 10^n$ where $d_i \in \{0, 1, 2, ..., 9\}$ for i = 1, 2, 3 $-8, \ldots, 10$. The normalized floating-point numbers **T** nonzero numbers of the form $\pm d_1.d_2d_3 \cdot 10^n$ with in this system have n = -10, $d_1 = 0$ and $d_i \neq 0$ for at least one $d_1 \neq 0$. The \blacksquare floating-point number system, this number system of i = 2 or iInfty and —Infty, which stand for numbers that are also has the tv too large in m **u**sitive or negative, respectively) to represent in this floating-point system. The system also has a NaN, which stands for "not-a-number".

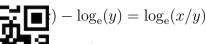
In the floating-point number system described above, what is the result of each of the floating-point and interior of the floating-point a

- a normalized number in this floating-point system, if possible,
- a subnormal number in this floating-port system in the case of gradual inderflow,
 zero in the case that the true answer is zero or there is an underflow to zero,
- +Infty or -Infty in the case of overflow,
- NaN if the that after contrast is any 6 de com

- (c) $(4.04 \cdot 10^{-7}) \times (-3.03 \cdot 10^{-5})$
- (d) $(-3.03 \cdot 1)$ typ. 5: // tutores.com (e) $((7.06 \cdot 10^6) \times (2.03 \cdot 10^4)) ((4.02 \cdot 10^5) \times (3.01 \cdot 10^5))$

2. [5 marks]

Assume both And Pare position real numbers Cas 4 And I affect, we would expect some cancellation in computing $\log_e(x) - \log_e(y)$. On the other hand,



and $\log_{e}(x/y)$ computing $\log_{e}(y)$?

Hint: for what

tions (hence no cancellation). Does this mean that ve a more accurate result than computing $\log_{e}(x)$ –

on log_e poorly conditioned?

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3. [5 marks] Assume Email: tutorcs@163.com

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$$OO^{x} = \begin{pmatrix} 2 \\ -3 \\ 74 \end{pmatrix} 9389476 \begin{pmatrix} 2 & 1 & -3 \\ -2 & 3 & -2 \\ 3 & -1 & 4 \end{pmatrix}$$

Give the value of each of the following norms.

- (a) $||x||_1$
- (b) $||x||_2$
- (c) $||x||_{\infty}$
- (d) $||A||_1$
- (e) $||A||_{\infty}$

4. [5 marks] Recall that, for程,后此后与大的。CS编辑辅导

$$\|p - \left(\sum_{i=1}^{n} |x_i|^p\right)^{1/p}$$

natrix p-norm subordinate to this vector p-norm is For any real n

$$\max_{x \neq 0} \frac{\|Ax\|_p}{\|x\|_p} = \max_{\|x\|_p = 1} \|Ax\|_p$$

Assuming A is nonsingular,

WeChat: $\operatorname{cstutores}^{\operatorname{cond}_p(A)} = \|A\|_p \|A^{-1}\|_p$

Let D be a real $n \times n$ diagonal matrix. That is,

Assignment Project Exam Help $D = \begin{bmatrix} 0 & 0 & d_3 & \cdots & 0 \\ 0 & 0 & d_3 & \cdots & 0 \end{bmatrix}$ Email: tutores @ 163.com

where $d_i \in \mathbb{R}$ for $i = 1, 2, \dots, n$. In addition, assume that $d_i \neq 0$ for $i = 1, 2, \dots, n$. I mentioned in das that 749389476 $\operatorname{cond}_p(D) = \frac{\max\{|d_i|: i = 1, 2, \dots, n\}}{\min\{|d_i|: i = 1, 2, \dots, n\}} \tag{1}$

$$\operatorname{cond}_{p}(D) = \frac{\max\{|d_{i}| : i = 1, 2, \dots, n\}}{\min\{|d_{i}| : i = 1, 2, \dots, n\}}$$
(1)

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Explain why (1) is true.