

Name:  
Roll Number:

## BM5063 Mathematical Physiology and Systems Medicine

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### Exam 4

#### Instructions

1. This exam is open notes where you can use any hand-written material. Photocopies/prints/books/electronic devices are not permitted to be used.
  2. Please note, more informative answers are rewarded more. For example, for question *Who was Karna in the Mahabharata?*
    - A warrior
    - A rival of Arjuna
    - Kunti's abandoned son, raised by charioteer, became Duryodhana's ally
    - warrior, Arjuna's rival, Kunti's son, Durydhana' ally, Dronacharya/Kripa/Parashurama-trained, Anga kingall four answers are technically correct but they will be rewarded differently.
  3. **All questions are to be answered in 10 coherent words or less. A list of words (fourth answer above) will not be considered an answer.**
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#### Questions

1. How does the body compensate for insulin resistance in healthy individuals?
2. What is the function of cortisol?
3. What stimulates thyroid hormone production?
4. What is a common feature of autoimmune diseases of endocrine glands?
5. Which growth factors are involved in fibrosis?
6. What is the negative feedback mechanism in the HPA axis?
7. Which drug strategy could effectively lower cortisol long-term?

8. What is the most common cause of hypothyroidism?
9. What is the primary function of insulin in the body?
10. What is the role of regulatory T cells (Treg) in autoimmune surveillance?
11. What is the primary function of fibrosis in response to injury?
12. What could be the primary reason fibrosis becomes more common with aging?
13. What is glucotoxicity?
14. What is the role of myofibroblasts in tissue repair?
15. What is the effect of aging on beta-cell growth?
16. What are the characteristic features of inflammation? *(A list of features will be okay here)*
17. Why is there a delay in TSH normalization after Hashimoto's (immune attack on thyroid gland) treatment?
18. What is the key feature of pre-diabetes?
19. What are the main cell types involved in fibrosis?
20. What is autocrine signaling?