

# 國立臺北科技大學

## 一〇二學年第二學期電機系博士班資格考試

### 圖形識別 試題

第一頁 共一頁

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#### 注意事項：

1. 本試題共【5】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

1. (25%) Let  $f(net) = a \tanh(b net) = a \left[ \frac{1-e^{-b net}}{1+e^{-b net}} \right] = \frac{2a}{1+e^{-b net}} - a$ .

(a) Show that its derivative  $f'(net)$  can be written simply in terms of  $f(net)$  itself.

(b) What are  $f(net), f'(net), f''(net)$  at  $net = -\infty, 0, +\infty$

2. (25%) Many pattern recognition systems can be partitioned into components: **sensing, segmentation, feature extraction, classification, post-processing**. Please address these components, respectively.
3. (20%) Please propose some practical techniques for **improving backpropagation** of multilayer neural networks.
4. (15%) Please explain **k-means clustering**.
5. (15%) Please explain **Principal Component Analysis (PCA)**.