

# 國立臺北大學 115 學年度日間學士班轉學生招生考試試題

學制系級：資訊工程學系日間學士班 2 年級

科目：微積分

第1頁 共1頁

可 不可使用計算機

1. (20%) Let  $f(x)$  be a function within domain  $\mathbb{R}$ .

(a) (5%) Show that  $E(x) = f(x) + f(-x)$  is an even function.

(b) (5%) Show that  $O(x) = f(x) - f(-x)$  is an odd function.

(c) (5%) Prove that every  $f(x)$  can be written as a sum of an even function and an odd function.

(d) (5%) Express the function  $f(x) = 2^x + (x - 3)^2$  as a sum of an even function and an odd function.

2. (30%) Find the tangent line to the curve  $y = x^3 + 1$  at the point  $(1, 2)$ .

(a) (20%) Find the slope using different definitions of limits:

$$m = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}, \quad m = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

(b) (10%) Solve equation of the tangent line.

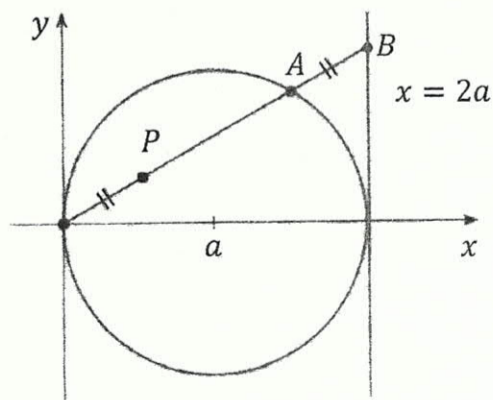
3. (20%) Use Fundamental Theorem to evaluate the integral.

$$\int_0^1 (u + 2)(u - 3) du$$

4. (30%)

(a) (20%) Find parametric equations for the set of all points  $P$  as shown in the figure such that  $|OP| = |AB|$ .

(b) (10%) Using the parametric equations to graph the curve of  $P$ .



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