

**ERASMUS UNIVERSITY ROTTERDAM**  
**Entrance examination Mathematics level 2**  
**for International Business Administration (IBA)**  
**PRACTICE EXAM ANSWERS**

Below, only the final answers (and no graphs) are given. Note that at the actual entrance exam all necessary steps, formulas, figures and substitutions leading to your final answer must also be reported.

**Question 1** maximum score: 4 points (2+2)

- (a)  $x = -4$  and  $y = 3$
- (b)  $x = -3$  and  $y = -4$

**Question 2** maximum score: 9 points (3+3+3)

- (a)  $f'(x) = \frac{x}{\sqrt{x^2 + 4}}$
- (b)  $f'(x) = \frac{1}{x - 6}$
- (c)  $f'(x) = 1$

**Question 3** maximum score: 11 points (4+4+3)

- (a)  $f'(x) = (-2x + 2)e^{-x^2+2x} = 0$  when  $x = 1$ . Since  $f'(0) > 0$  and  $f'(2) < 0$ , it follows that  $f$  has a maximum in  $x = 1$
- (b) 2 inflection points:  $x = 1 \pm \frac{1}{2}\sqrt{2}$
- (c) Domain of  $f$  is equal to  $\mathbb{R}$

**Question 4** maximum score: 9 points (3+3+3)

- (a)  $x = 5$  or  $x = -5$
- (b)  $x = -1$
- (c)  $x = -1$ . Note: the equation can be rewritten as  $3^{2x} = 3^{-2(3x+4)}$

**Question 5** maximum score: 6 points (3+2+1)

- (a) Note: the graph of  $f(x)$  is V-shaped and the graph of  $g(x)$  is a parabola
- (b)  $x = 3$  or  $x = -3$
- (c)  $x \in (-\infty, -3] \cup [3, \infty)$

**Question 6** maximum score: 6 points (2+2+2)

- (a)  $y = \frac{2}{5}x - 1$
- (b)  $y = -\frac{5}{2}x + 28$
- (c)  $y = 21x - 207$

**Question 7** maximum score: 6 points (3+2+1)

- (a) Note: the graph of  $f(x)$  is a straight line and the graph of  $g(x)$  consists of 2 separate parts
- (b)  $x = 1\frac{1}{2}$  or  $x = -2\frac{1}{2}$
- (c)  $x \in [-2\frac{1}{2}, -\frac{1}{2}) \cup [1\frac{1}{2}, \infty)$

**Question 8** maximum score: 4 points (2+2)

- (a)
  - (i) Discriminant  $> 0$  hence 2 solutions
  - (ii) Discriminant  $< 0$  hence no solutions
  - (iii) Discriminant  $> 0$  hence 2 solutions
- (b)  $p \in (0, 12)$

**Question 9** maximum score: 5 points

Second point of inflection:  $(0, 40)$ .

Note:  $a = 2$  and  $b = 40$

**Grade = Score/6**