

R University

Statistics Exam 2020-04-24

Exam ID 2

Name: _____

Student ID: _____

Signature: _____

1. (a) ☐ (b) ☒ (c) ☐ (d) ☐ (e) ☐

2.

					1
--	--	--	--	--	---

 .

3	7	0
---	---	---

1. **Problem**

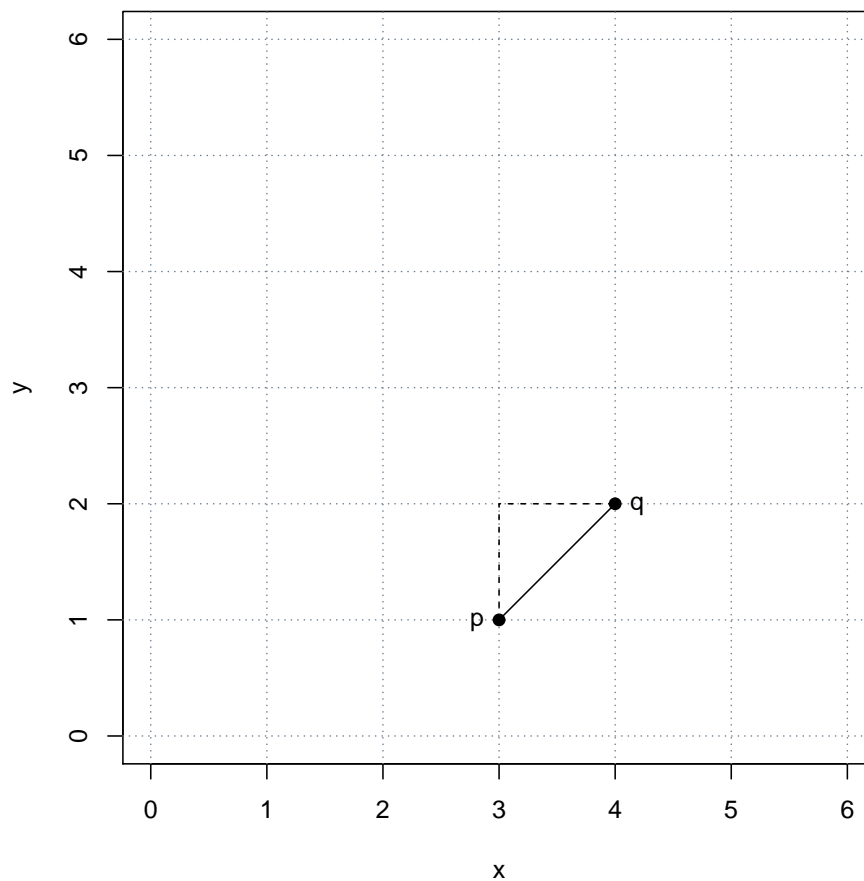
What is the distance between the two points $p = (3, 1)$ and $q = (4, 2)$ in a Cartesian coordinate system?

- (a) 2.597
- (b) 1.414
- (c) 0.497
- (d) 1.755
- (e) 7.616

Solution

The distance d of p and q is given by $d^2 = (p_1 - q_1)^2 + (p_2 - q_2)^2$ (Pythagorean formula).

Hence $d = \sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2} = \sqrt{(3 - 4)^2 + (1 - 2)^2} = 1.414$.



- (a) False
- (b) True
- (c) False
- (d) False
- (e) False

2. **Problem**

What is the derivative of $f(x) = x^9 e^{3.6x}$, evaluated at $x = 0.59$?

Solution

Using the product rule for $f(x) = g(x) \cdot h(x)$, where $g(x) := x^9$ and $h(x) := e^{3.6x}$, we obtain

$$\begin{aligned} f'(x) &= [g(x) \cdot h(x)]' = g'(x) \cdot h(x) + g(x) \cdot h'(x) \\ &= 9x^{9-1} \cdot e^{3.6x} + x^9 \cdot e^{3.6x} \cdot 3.6 \\ &= e^{3.6x} \cdot (9x^8 + 3.6x^9) \\ &= e^{3.6x} \cdot x^8 \cdot (9 + 3.6x). \end{aligned}$$

Evaluated at $x = 0.59$, the answer is

$$e^{3.6 \cdot 0.59} \cdot 0.59^8 \cdot (9 + 3.6 \cdot 0.59) = 1.366213.$$

Thus, rounded to two digits we have $f'(0.59) = 1.37$.