

R University

Statistics Exam 2020-04-24

Exam ID 3

Name: _____

Student ID: _____

Signature: _____

1. (a) ☒ (b) ☐ (c) ☐ (d) ☐ (e) ☐

2.

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1. **Problem**

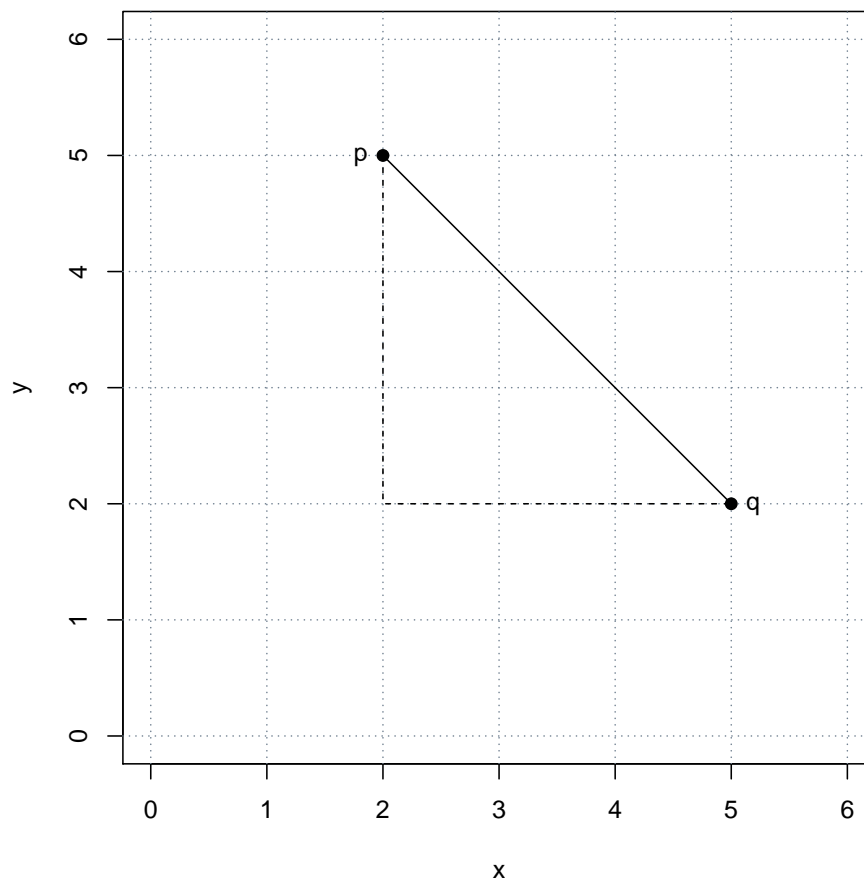
What is the distance between the two points $p = (2, 5)$ and $q = (5, 2)$ in a Cartesian coordinate system?

- (a) 4.243
- (b) 8.846
- (c) 6.522
- (d) 9.899
- (e) 1.748

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 $d = \sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2} = \sqrt{(2 - 5)^2 + (5 - 2)^2} = 4.243$.



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

2. **Problem**

What is the derivative of $f(x) = x^4 e^{4x}$, evaluated at $x = 0.65$?

Solution

Using the product rule for $f(x) = g(x) \cdot h(x)$, where $g(x) := x^4$ and $h(x) := e^{4x}$, we obtain

$$\begin{aligned} f'(x) &= [g(x) \cdot h(x)]' = g'(x) \cdot h(x) + g(x) \cdot h'(x) \\ &= 4x^{4-1} \cdot e^{4x} + x^4 \cdot e^{4x} \cdot 4 \\ &= e^{4x} \cdot (4x^3 + 4x^4) \\ &= e^{4x} \cdot x^3 \cdot (4 + 4x). \end{aligned}$$

Evaluated at $x = 0.65$, the answer is

$$e^{4 \cdot 0.65} \cdot 0.65^3 \cdot (4 + 4 \cdot 0.65) = 24.403362.$$

Thus, rounded to two digits we have $f'(0.65) = 24.40$.