UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: B.Sc. IV in Agricultural Economics and Agribusiness Management

COURSE CODE: AEM 405

TITLE OF PAPER: PRODUCTION ECONOMICS

TIME ALLOWED: TWO (2) HOURS

INSTRUCTION: 1.   ANSWER ALL QUESTIONS
            2.   EACH QUESTION CARRIES TWENTY (25) MARKS

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Question One

(a)   Assuming the classical production function, what can be said about the elasticity of production at the output at which:

    (i)   The marginal physical product (MPP) is at a minimum?

    (ii)   The average physical product (APP) is at a maximum?

    (iii)   The marginal physical product is zero?

    (iv)   The marginal physical product equals average physical product?

    (v)   The marginal physical product is negative?

    (vi)   The marginal physical product is less than the average physical product?   **(18Marks)**

(b)   Given that $Y = 0.5X^{\beta}$, using calculus, prove that β is the elasticity of production. **(7Marks)**

Question Two

(a)   Cost functions and production functions are by nature inversely related, and given one set of functions and input prices one can derive the other set of functions. For the Cobb-Douglas production function, $Y = 6X^{1/2}$, derive the marginal cost equation.   **(10Marks)**

(b)   Given the average variable cost equation, $AVC = Y^2 - 2Y + 2$,

    (i)   Derive the total variable cost and marginal cost equations.

    (ii)   At what level of output is the average variable cost at a minimum?

    (iii)   At what level of output is the marginal cost at a minimum?   **(15Marks)**

Question Three

(a)   Consider the production function, $Y = X_1^{1/5}X_2^{3/5}$. If Px$_1$=E3.00, Px$_2$=E1.00, and Py=E10.00, at what levels of X$_1$ and X$_2$ will net return be maximized?   **(17Marks)**

(b)   Show using calculus that at the minimum average cost, the average cost is equal to the marginal cost.
          (8Marks)

Question Four

(a)   With the aid of diagrams, explain the following relationships among farm enterprises:

    (i)   Competitive products;
    (ii)   Supplementary products.   **(10Marks)**

(b)   Given that the production function for corn is $C = 65.54 + 1.084N_c - 0.003N_c^2$ while that for sorghum is $S = 68.07 + 0.830N_s - 0.002N_s^2$. What combination of corn and sorghum will yield maximum returns if the unit price of corn is E3.00 and the unit price of sorghum is E2.50 when the total amount of nitrogen available is 300kg?   **(15Marks)**