Name————————————, ID ——————

MTH 203, Calculus III, Quiz one

Ayman Badawi

QUESTION 1. a) Find a vector in 2D, say v, where $|v| = 3.4$ and it is perpendicular to the vector $w = -3i + 4j$.

QUESTION 2. Given $q_1 = (1, 1, 1), q_2 = (-1, 1, 1), q_3 = (0, 1, 2)$ are three points in 3D.
a) Is there a unique plane containing q_1, q_2, q_3? Explain

b) If the answer is yes for part (a), then find the equation of the plane.

QUESTION 3. Given $(1, 1, 1)$ lies on the line L that is perpendicular to the plane $-2x + y + z = -7$. Find the parametric equations of L. Since L intersects the given plane in one point say Q, find Q.

Faculty information

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.
E-mail: `abadawi@aus.edu, www.ayman-badawi.com`

Name———————————————, ID ————————

MTH 203, Calculus III, Quiz two

Ayman Badawi

QUESTION 1. (Circle the correct answer)

(i) Given V_1 and V_2 are vectors having the same initial point where $V_1 = 2i - 2j + k, V_2 = i + j - 3k$. Then $|proj\ _{V_1}V_2| =$

a) $\frac{-3}{9}$ b) $\frac{3}{9}$ c)1 d) None

(ii) Let V_1, V_2 as in the previous question. Then $proj\ _{V_1}V_2 =$

a) -2i + 2j - k b) $\frac{2}{3}i - \frac{2}{3}j + \frac{1}{3}k$ c) -$\frac{2}{3}i + \frac{2}{3}j - \frac{1}{3}k$ d)None

(iii) One of the following vectors lies in the plane $2x + y + z = 12$

a) $< 1, 0, 10 >$ b) 2i + j + k c) -i + 2k d) <-2, 0, -4>

(iv) One of the following is a standard form of the plane $3x - 2y + 5z = 30$ is

a) $3x - 2y + 5z - 20 = 0$ b) $3x - 2(y - 10) + 5(z - 10) = 0$ c) 3(x - 10) - 2y + 5(z- 6) = 0 d) None

(v) One of the following planes is perpendicular to the plane $3x - y + z = 1$

a) $-2x + 6z = 30$ b) 6x - 2y + 2z = 0 $c) - x + 3y = 1$ d) none

(vi) One of the following lines is parallel to the plane $x + y + z = 10$

a) $x = 2t, y = t, z = 1 - 3t$ b) b$x = 2t, y = 4 + 6t, z = 6 - 8t$ c) $x = 2t, y = t, z = 4 - 2t$ d) none

(vii) Given $2x - 1 = y + 4 = -z + 5$ are the symmetric equations of a line in $3D$. Parametric equations of the line can be :

a) $y = t, x = t+5, z = 1-t$ b) $x = t, y = 2t-5, z = 6-2t$ c) $x = 2t-1, y = t+4, z = -t+5$ d)None

(viii) Given the parametric equations of two lines: $L_1 : x = 1 + t, y = 3 + 2t, Z = 4 - t$ and $L_2 : x = 1 - s, y = 5 + 2s, z = 4 - s$. Then

a) L_1 is parallel to L_2 b) L_1 is the same line as L_2 c) L_1 and L_2 are screw lines d) L_1 and L_2 are interesting lines.

(ix) Let V_1, V_2 be vectors in 3D having the same initial point. Given $V_1 \times V_2 = \sqrt{2}i + j + k$, the angle between V_1 and V_2 > 90, and $|V_1| = |V_2| = 2$. Then $V_1.V_2 =$

a) -2 b) -4 c) $-\sqrt{3}$ d)$-2\sqrt{3}$ e) Cannot be determined.

(x) Given the two planes $x + y + z = 4$ and $-x - y = 2$ interest in a line L. Parametric equation of L can be :

a) $x = -t, y = 2+t, z = 2$ b)$x = t, y = 2-t, z = 2$ c) $x = 2t, y = -2t, z = 4$ d)$x = t, y = -2-t, z = 6$ e)None

Faculty information

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.
E-mail: abadawi@aus.edu, www.ayman-badawi.com

Name————————————————, ID ————————

MTH 203, Calculus III, Quiz Three

Ayman Badawi

QUESTION 1. (**Circle the correct answer**)

(i) Given $Q = (\sqrt{8}, 1)$ is not on the line $L : y = \sqrt{8}x + 5$. The distance between Q and the line L is :

a) 3 b) 2 c) 2/3 d)4

(ii) Given $Q = (0, 2, -2)$ is not on the line $L : x = t, y = 2 + 2t, z = 2 - 2t$. The distance between Q and L is

a) $\sqrt{5}/9$ b) $\sqrt{5}/3$ c) $2\sqrt{5}$ d)$4\sqrt{5}/3$

(iii) An equation of the plane where each point in the plane is equidistant from the two points $Q_1 = (1, 3, 0)$ and $Q_2 = (3, 1, 2)$

a)$-2x + 2y - 2z = -2$ b) $2x - 2y + 2z = -4$ c)$x - y + z = 3$ d) $x - y + z = 4$

(iv) Given $P_1 := \sqrt{6}x - 3y + 7z = 0$ and $P_2 : -2\sqrt{6} + 6y - 14z = -64$ are non-intersecting planes. Distance between P_1 and P_2 is

a) 4 b) 8 c)1 d)2

(v) Let V be a vector where $V =< \sqrt{11}, -3, 4 >$. Then V makes an angle with the positive x-axis equals to

a) 30 b) 120 c) 150 d) 60

(vi) Given $Q_1 = (1, -5), Q_2 = (4, -6), Q_3 = (2, -8)$ are the vertices of a triangle in $2D$. The area of the triangle is

a) 5 b) 4 c) 8 d) 5

(vii) Given two lines $L_1 : x = 0.5t, y = 2 + t, z = -2 - t$ and $L_2 : x = s, y = 2 + 2s, z = 2 - 2s$ where L_1 and L_2 are non-intersecting PARALLEL lines. The distance between L_1 and L_2 is

a) $2\sqrt{5}$ b) $\sqrt{5}/3$ c) $4\sqrt{5}/3$ d) Cannot be determined

(viii) Given $v_1 = 2i + j - 6k, v_2 = 4i + j, v_3 = -i + 3j$ (all having the same initial point in 3D) form a parallel-piped object in 3D. The volume of the object is

a) 13 b)66 c) 78 d)11

Faculty information

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.
E-mail: `abadawi@aus.edu, www.ayman-badawi.com`

Name—————————————, **ID** ——————

MTH 203, Calculus III, Quiz FIVE

Ayman Badawi

QUESTION 1. (Circle the correct answer)

(i) Let $r(t) =< 2,\ sin(2t),\ cos(2t)$. The Unit normal vector at $t = \pi/8$ is

a) $< 0,\ \sqrt{2}/2,\ -\sqrt{2}/2 >$ b) $< 0, -\sqrt{2}/2, -\sqrt{2}/2 >$ c) $< 0,\ -\sqrt{2}/2,\ \sqrt{2}/2 >$

(ii) Let $r(t) =< 4t,\ 3t,\ 5 >$. Then the arc-length of $r(t)$ when t is between 1 and 6

a) 25 b)30 c) 125 d) 150

(iii) Let $r(t) =< \sqrt{16 - t^2},\ \sqrt{t-1},\ \dfrac{1}{\sqrt{3-t}} >$. The domain of $r(t)$ is

a) $(-4,\ 4) \setminus \{3\}$ b) $[1,\ 3)$ c) $(-\infty,\ 4) \setminus \{3\}$ d) $[1,\ \infty) \setminus \{3\}$

(iv) Given $r'(t) =< 6t(1+t^2)^2,\ \dfrac{-e^t}{2-e^t},\ 2e^{2t} >$ and $r(0) =< 4, 5, -2 >$. Then $r(t)$

a) $< (1+t^2)^3 + 3,\ ln|2 - e^t| + 5,\ e^{2t} - 3 >$ b) $< (1+t^2)^3,\ ln|2 - e^3| + 4, e^{2t} - 2 >$

c) $< 2(1+t^2)^3 + 2,\ -ln|2 - e^t| + 5,\ 2e^{2t} - 4 >$

(v) The arc-length of $r(t) =< 2sin(t),\ \sqrt{2}cos(t),\ \sqrt{2}cos(t) + 1 >$ when t is between 0 and $\pi/2$ is

a) 2π b) π c) $\pi/2$ d) $\sqrt{2}\pi/2$

Faculty information

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.
E-mail: `abadawi@aus.edu, www.ayman-badawi.com`

MTH 203, Calculus III, Quiz Six

Ayman Badawi

QUESTION 1. (i) Let $f(x, y) = 2x^2 + e^y + yx$. Find $D_u(1, 0)$ in the direction of $v = 3i + 4j$. What is the maximal value of $D_u(1, 0)$? and in which direction does the max of $D_u(1, 0)$ occur?

(ii) Find equations for the tangent plane and the normal line to the surface $e^z + x^2y + y = 3$ at $(1, 1, 0)$

Faculty information

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.

E-mail: `abadawi@aus.edu, www.ayman-badawi.com`

Name————————————, ID ————————

MTH 203, Calculus III, Quiz SEVEN

Ayman Badawi

QUESTION 1. (i) Let $D = \{(x, y) \mid x^2 + y^2 \leq 9 \text{ where } x, y \geq 0\}$ (i.e., D is a quarter of a circle of radius 3 in the first quadrant of the xy-plane). Find the volume of the solid object that is determined by $f(x, y) = x^2y$ over D

(ii) Determine the surface area of the solid object that is determined by $f(x, y) = x^3 + 2y$ over the region D in the xy-plane that is bounded by the $x - axis$ and $y = x^3$.

Faculty information

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.

E-mail: `abadawi@aus.edu, www.ayman-badawi.com`