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Exam I: MTH 111, Spring 2016

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QUESTION 1. (i) Consider the parabola $y = -2x^2 + 8x - 14$. The vertex is

a. $(2, -3)$ ~~b.~~ $(2, -6)$ c. $(-2, 6)$ d. $(-2, 3)$

(ii) Consider the parabola $y = -2x^2 + 8x - 14$. The directrix is

a. $y = -\frac{1}{8}$ b. $x = -\frac{1}{8}$ c. $y = -\frac{49}{8}$ ~~d.~~ $y = -\frac{47}{8}$.

(iii) Consider the parabola $8(y + 7) = (x - 6)^2$. Then the focus is

~~a.~~ $(6, -5)$ b. $(6, -9)$ c. $(8, -7)$ d. $(8, -7)$ e. $(4, -7)$,

(iv) Let F be the focus of a parabola $y = -ax^2 + bx + c$, where $a > 0$ (open downward). Assume that $Q = (2, 3)$ is a point on the curve of the parabola such that $|QF| = 8$. Then the directrix of the parabola is

a. $y = 7$ ~~b.~~ $y = 11$ c. $y = 10$ d. $y = -5$
e. neither (a) nor (b) nor (c) and I recommend this answer:

(v) One of the foci of $\frac{(x-3)^2}{21} - \frac{y^2}{4} = 1$ is

a. $(3, 5)$ b. $(0, -5)$ ~~c.~~ $(-2, 0)$ d. $(-8, 0)$ $(3, 0)$

(vi) The constant K of $\frac{(y+3)^2}{100} - \frac{x^2}{16} = 1$ is

~~a.~~ 20 b. 8 c. 13 d. 10 e. 4

(vii) One of the foci of $x^2 + \frac{(y-2)^2}{10} = 1$ is

a. $(3, 2)$ b. $(0, 3)$ c. $(0, 2 + \sqrt{10})$ ~~d.~~ $(0, 5)$

(viii) Given $Q = (1, 1, 1)$ is not on the plane $P : 2x + 2y + z - 23 = 0$. Then $|QP|$ = (distance between Q and P)

a. 23 b. 3 c. $\frac{23}{\sqrt{3}}$ ~~d.~~ 6

(ix) The equation of the plane that contains the points $(1, -2, 0)$, $(3, 1, 4)$, and $(0, -1, 2)$ is

a. $2(x-1)+(y+2)+5z = 0$ b. $2(x-1)-(y+2)+5z = 0$ ~~c.~~ $2(x-1)-8(y+2)+5z = 0$
d. $(x - 1) + (y + 2) + 5z = 0$

(x) One of the following vectors can be drawn inside the plane $P : x - y + 2z = 12$

~~a.~~ $< 1, 3, 1 >$ b. $< 1, -1, 2 >$ c. $< 4, 2, 6 >$ d. $< 2, 6, 0 >$

(xi) Given that the planes $2x + y + z = 0$ and $x + 2y - z = 10$ intersect in a line L. Then a directing vector for L is

a. 3i + 3j - 2k b. -3i + 3j + 2k ~~c.~~ -3i +3j + 3k d. -3i - 3j + 3k

(xii) Let $v = i + 2j + 2k$ and $u =< 0, 0, 9 >$. Then $|Proj_v^u| =$

a. 1 b. 2 ~~c.~~ 6 d. $\frac{1}{3}$

(xiii) The point $Q = (2, 2, 1)$ does not lie on the line $L : x = 2t, y = t, z = 2t$, where $t \in R$. Then $|QL| =$

a. $\sqrt{7}$ b. 3 c. 2 d. $\sqrt{5}$ ~~(e)~~ $\frac{\sqrt{17}}{3}$

(xiv) Given $(1, -1, 2)$ and $(2, -3, 8)$ are two points on a line L. The parametric equations of L are :

~~a.~~ $x = 1 + t, y = -1 - 2t, z = 2 + 6t$, where $t \in R$. b. $x = 1 + 3t, y = -1 - 4t, z = 2 + 10t$, where $t \in R$ c. Neither (a) nor (b) and I recommend this answer:

(xv) One of the following points lie on the line $x = 1 + 3t, y = -1 - 4t, z = 2 - 10t$, where $t \in R$

a. $(7, -9, 22)$ b. $(10, 13, -28)$ ~~c.~~ $(-2, 3, 12)$.

(xvi) Let θ be the angle between $v =< -1, 2, 2 >$ and $u =< 1, 2, 2 >$. Then $cos(\theta)$ is

a. $\frac{7}{81}$ ~~b.~~ $\frac{7}{9}$ c. $\frac{1}{9}$ d. 1

(xvii) Given $f_1 = (2, -6), f_2 = (2, 2)$ are the foci of an ellipse and $k = 14$ is the ellipse constant. The equation of the ellipse is :

a. $\frac{(x-2)^2}{14} + \frac{(y+2)^2}{23} = 1$ b. $\frac{(x-2)^2}{49} + \frac{(y+2)^2}{33} = 1$

~~c.~~ $\frac{(x-2)^2}{33} + \frac{(y+2)^2}{49} = 1$ d. neither (a) nor (b) nor (c) and I recommend this answer:

xviii) Consider the parabola $10(y + 3) = (x - 7)^2$ with focus F and vertex V. Then $|FV|$ =

a. 10 b. 5 ~~c. 2.5~~ neither (a) nor (b) nor (c) and I recommend this answer:

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