

Name:

SOLUTIONS

241S1 Quiz #2 - September 15, 2015, 10 a.m.

1. Find the parametric equation for the line through the point $(2, 3, 1)$ and parallel to the vector $(1, 2, 3)$.

$$\vec{r}(t) = (2, 3, 1) + t(1, 2, 3)$$

2. Find the equation (in any form you like) for the plane through the point $(3, -2, 8)$ and parallel to the plane $x + 2y - 3z = 7$.

$$\vec{n} = (1, 2, -3) \text{ so}$$

$$(1, 2, -3) \cdot (x-3, y+2, z-8) = 0$$

OR

$$x + 2y - 3z = -25$$

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2. Find the equation (in any form you like) for the plane through the point $(3, -2, 8)$ and parallel to the plane $x + 2y - 3z = 7$.

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241S2 Quiz #2 - September 17, 2015, 11 a.m.

1. Find the point at which the line $\vec{r}(t) = (2 - 2t, 3t, 1 + t)$ intersects the plane $x + 2y - z = 7$.

$$2 - 2t + 2(3t) - (1 + t) = 7$$

$$2 - 2t + 6t - 1 - t = 7$$

$$3t + 1 = 7$$

$$t = 2$$

$$\vec{r}(2) = (-2, 6, 3)$$

2. Find the unit tangent vector to the curve $\vec{r}(t) = (t^2 - 2, t^3, t + 7)$ at the point $(2, 8, 9)$.

$$\vec{r}'(t) = (2t, 3t^2, 1)$$

$$\vec{r}'(2) = (4, 12, 1)$$

$$|\vec{r}'(2)| = \sqrt{161}$$

$t = 2$

$$\frac{1}{\sqrt{161}} (4, 12, 1)$$

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241S2 Quiz #2 - September 17, 2015, 11 a.m.

1. Find the point at which the line $\vec{r}(t) = (2 - 2t, 3t, 1 + t)$ intersects the plane $x + 2y - z = 7$.

2. Find the unit tangent vector to the curve $\vec{r}(t) = (t^2 - 2, t^3, t + 7)$ at the point $(2, 8, 9)$.

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SOLUTIONS

241S3 Quiz #2 - September 17, 2015, 10 a.m.

1. Find the equation of a plane through the points $(2, 1, 2)$, $(3, -8, 6)$ and $(-2, -3, 1)$.

$\begin{matrix} & P & Q & R \\ & (2, 1, 2) & (3, -8, 6) & (-2, -3, 1) \end{matrix}$

$\vec{PQ} = \langle 1, -9, 4 \rangle$ and $\vec{PR} = \langle -4, -4, -1 \rangle$ are parallel to plane so

$$\vec{n} = \vec{PQ} \times \vec{PR} = \langle 25, -15, -40 \rangle$$

$$\boxed{\langle 25, -15, -40 \rangle \cdot \langle x-2, y-1, z-2 \rangle = 0}$$

2. Find the tangent line to the curve $\vec{r}(t) = \langle t^2 - 2, t^3, t + 7 \rangle$ at the point $(-1, 1, 8)$.

$$\vec{r}'(t) = \langle 2t, 3t^2, 1 \rangle$$

\curvearrowright corr to $t = 1$

$$\vec{r}'(1) = \langle 2, 3, 1 \rangle$$

$$\boxed{\langle -1, 1, 8 \rangle + t \langle 2, 3, 1 \rangle = \vec{r}}$$

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241S3 Quiz #2 - September 17, 2015, 10 a.m.

1. Find the equation of a plane through the points $(2, 1, 2)$, $(3, -8, 6)$ and $(-2, -3, 1)$.

2. Find the tangent line to the curve $\vec{r}(t) = \langle t^2 - 2, t^3, t + 7 \rangle$ at the point $(-1, 1, 8)$.