

Test Total

Name _____

Test 1 Calculus III 3450:223–321 Dr. Norfolk

Show all of your work and explain your reasoning. Give exact answers where possible.

1. Consider the line which passes through $P(2, 1, -3)$ and $Q(3, 0, -5)$.

(a) Write a *symmetric* equation for this line.

5 points

(b) Find where this line intersects the yz -plane.

5 points

(c) Find the distance from the point of intersection with the yz -plane and the point P .

5 points

(d) Find the angle between the line and the x -axis.

5 points

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2. Consider the lines

$$L_1 : x = 1 - t; y = -2 + 2t; z = 4t$$

and

$$L_2 : \underline{r} = \langle 2, -2, c \rangle + s \langle 1, 1, 2 \rangle$$

(a) Find the value of c so that these lines intersect.

10 points

(b) Find the equation of the plane which contains both lines.

5 points

3. A ball is thrown from 4 ft above the ground at an angle of 60° , and initial speed 40 ft/s . There is a wall 30 ft away on flat ground, of height 20 ft . Assume that $g = 32 \text{ ft/s}$.

Will the ball go over the wall?

10 points

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4. The position of a particle at time t is given by

$$\underline{r}(t) = \langle \ln(1 + e^t), \sin^{-1}(t/2), t \sec t \rangle.$$

Find the *equation* of the *tangent line* when $t = 0$.

15 points

5. The velocity of a particle at time t is given by $\underline{v}(t) = \langle \frac{1}{t^2 + 4}, t \cos(t), \frac{1}{(t + 1)(t + 2)} \rangle$, and the initial position is $\underline{r}(0) = 2\underline{j} - 3\underline{k}$.

Find the position function $\underline{r}(t)$.

15 points

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