

1. Let $b = \langle 1, 1, 1 \rangle$ and $a = \langle 1, 0, 1 \rangle$.
 - (a) Express b as $b = b_1 + b_2$ where b_1 is parallel to a and b_2 is orthogonal to a
 - (b) Sketch the appropriate triangle labeling all the vectors mentioned above.
 - (c) Find the angle between b and a
2. Express $b = \langle 2, 3, -1 \rangle$ as $b = b_1 + b_2$ where b_1 is parallel to a and b_2 is orthogonal to a and $a = \langle 0, 4, 2 \rangle$.
3. Find the equation of a plane that contains the point $(1, 0, -1)$ and is parallel to the plane $x + y + z = 14$.
4.
 - (a) Find the equation of a line that passes through the points $(-1, -2, 4)$ and $(4, 2, 1)$.
 - (b) Sketch the line in the first octant.
5.
 - (a) Find the equation of a plane through the points $(0, 0, 0)$, $(1, 1, 1)$, $(1, 2, 3)$.
 - (b) Sketch the plane in the first octant.
6. do an arclength problem, p 866 Example 1
7. For $r(t) = (2 \cos(t), 2 \sin(t), t)$.
 - (a) Sketch the curve in R^3 and plot the points $t = 0, \pi/2, \pi, 2\pi$ and find and plot the tangent line at $t = \pi/4$
 - (b) Find $r'(t), r''(t), T, N, B$
 - (c) Write $r''(t)$ in terms of T, N
8. do examples 7 p 879
9. Find the equation of a plane that contains the points $(2, 0, 1)$, $(0, 6, -2)$ and $(-2, 3, 0)$
10. Find the equation of a plane that contains the point $(1, 0, -1)$ and is parallel to the plane $3x + 6y + 2z = 6$.

11. Find the parametric equations of a line that satisfies the condition that it passes through the point $(1, 0, 2)$ and is parallel to the line whose parametric equations $x = t + 1, y = 3t, z = 4t + 1$.
12. Find the parametric equations of a line that passes through the points $(1, 2, 3)$ and $(0, 1, 3)$.
13. Find the equation of a line that passes through the point $(1, 7, 0)$ and is parallel to the y -axis.
14. **Sketch the following:**
 - (a) The surface $x^2 + y^2 + z^2 - 4x - 4y = 0$ (hint: complete the square). Partial credit will be given for the sketch in each of the planes.
 - (b) The curve $r(t) = (t, \sqrt{2} \cos(t), \sqrt{2} \sin(t))$.
 - (c) Sketch the surface $x^2 + y^2 - 9 = 0$
15. **Find the equation of the Plane which satisfy the following:**
 - (a) A plane through the points $(0, 0, 0), (1, 1, 1), (1, 2, 3)$.
 - (b) A plane through the point $(0, 1, 2)$ and containing the line $x = t, 2y = t, 3z = t$.
 - (c) Find the point where the line $x = t + 1, y = 2t, z = 3t$ and the plane $x + y + z = 1$ intersect.
16. **Answer the following:**
 - (a) Let L be the line in R^3 that passes through the points $P = (-1, -2, 4)$ and $Q = (4, 2, 1)$.
 - (b) At what point (if any) does L intersect the plane $x + y + 2z = 11$?
 - (c) If L is the line through $A = (3, 2, 1)$ and parallel to the vector $v = \langle -2, 1, 3 \rangle$, what's the equation of the plane that contains L and the point $B = (-2, 3, 1)$.
 - (d) Find the distance from the origin to the plane $x + 2y + 2z = 6$.
 - (e) Find the distance from the origin to a line .
17. Graph the solid in the first octant bounded by the plane $x + 2y + z = 4$.

18. Find the equation of a line that satisfies the condition that it passes through the point $(1, 2, 3)$ and is parallel to the line whose parametric equations $x = t + 1, y = -t, z = t - 4$.