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Exam 1 Review Questions
This material is compiled from exams from previous years as well as problems made by myself.

1. A curve C in 3-space is defined by: (4cost, 4sint, 3t)
    Find the point on C which has distance 2π from the point (4,0,0) as measured along the curve.
2. The planes $3x + 5y - z = 2$ and $x + 3y + z = 5$ intersect in a line. Find an equation for this line.
3. Find the point on the plane $2x-4y+7z=3$ closest to the point (1,2,3)
4. Let a be a scalar that makes the vectors v and w orthogonal.
    v = (1, -a, 20); w=(5a,1,1)
    Let b be the positive number that makes the triangle with vertices A (5, -1, 0), B (-2,-2, 3), C (5, 2, b) be a right triangle at C.
    Find a + b.
5. Find the arc length of $r(t) = (\cos^3 t, \sin^3 t, 1)$ for $0<t<\pi/4$
6. Find the distance between the point (1, 4, 2) and the line passing through the points (-1, 3, -1) and (1, 2, 3)
7. Find the equation (in terms of r, R, and h) for the ellipsoid whose cross sections at $z = 0$ and $z = h$ are circles with radius R and r, respectively.
8. Find the parametric equation for the line of intersection between the planes $x+2y-z=2$ and $-2x+2y+2z=-1$
9. An object is hit with an angle of 60° and lands on the ground 5 seconds later. Assuming $g = 10m/s^2$, what was the objects initial velocity?
10. A ball is hit with horizontal velocity of 20m/s and a vertical upward velocity of 30m/s. If the ball is initially 1m above the ground when it is hit, how high a fence will the ball clear if the fence is 80m away from where the ball is hit? Assume $g = 10m/s^2$.
11. Let L be the line through the origin that is perpendicular to the plane $2x+y+z=7$. Find the distance between the point (-4, 3, 5) and L.
12. Consider the line L with slope m through the point (-1,0). The line L intersects the unit circle at two points, (-1, 0) and P. What is the cosine of the angle between L and the tangent line to the circle through P?
13. The set of points equidistant from (2, -1,1) and (4, 3, -5) form a plane. Find the equation of the plane.
14. Find the value of the x coordinate where the plane through the points (4,1,1), (1,2,1) and (1,1,2) intersect the x axis.
15. Find the coordinate the point on the plane $x-2y+z=3$ closest to the point (1,1,1)
16. Find the curvature of $r(t) = (-t, -\ln(\cos t), 0)$ at $t=\pi/4$.
17. What is the maximum value of the curvature of $r(t) = (t, t, t^2)$?
18. Find the unit tangent vector to the curve $r(t) = (e^{2t}\cos t, e^{2t}\sin t, e^{2t})$ at $t=\pi/2$