Question: The number of points equidistant from a circle and two parallel tangents to the circle is: (A) o. (B) 2. (C) 3. (D) 4. (E) infinitely many. (20th American High School Mathematics Examination, 1969)

DeepSeek-R1: <think> \nThe problem is from the 20th American High School Mathematics Examination in 1969. It states: "The number of points equidistant from a circle and two parallel tangents to the circle is\" with options ranging from 0 to infinitely many.\n\nFirst, I need to understand what is being asked. We have a circle and two parallel tangents to this circle. I need to find points that are equidistant from the circle and from these two tangents. The phrasing is a bit ambiguous. Let me read it again.\n\n\"It says: equidistant from a circle and two parallel tangents.\" I think it means equidistant from the circle itself and from the pair of tangents. But distance to a circle usually means the shortest distance to the circumference, and distance to a line is the perpendicular distance.\n\nBut it says \"from a circle and two parallel tangents.\" It might mean equidistant from the circle and from each of the tangents, but that doesn't make sense because the tangents are lines, and the circle is a curve.\n\nPerhaps it means that the point is equidistant from the circle and from the two tangents considered together, but that seems messy.\n\nAnother interpretation: maybe it means that the distance to the circle is equal to the distance to each tangent, but that would probably be overconstrained.\n\nI recall that in some contexts, \"equidistant from a curve and a line\" means that the shortest distance to the curve equals the shortest distance to the line.\n\nBut here it's a circle and two lines.\n\nPerhaps the problem intends for the distance to the circle to be equal to the distance to the pair of tangents, but since the tangents are parallel, the distance to the pair might be the distance to the closer one or something.\n\nThat doesn't sound right.\n\n**Let me visualize** this. Let me sketch a circle. Assume it's a circle with center O. Draw two parallel tangents to this circle. Since they are parallel, they must be on opposite sides of the circle. For example, if the circle is centered at the origin, and the tangents are horizontal, say y = r and y = -r, but if the circle has radius r, and center at (0,0), then the tangents would be y = r and y = -r? No.\n\nIf center is at (0,0), radius r, then the tangent lines are x = +r for vertical tangents, but for horizontal, if I want parallel tangents, say both horizontal. So, if I have a circle $x^2 + y^2 = r^2$, the horizontal tangents are y = r and y = -r. Is that correct? When y = r, $x^2 + r^2$ = r^2 implies x=0, so yes, the point (0,r) is on the circle, and the tangent is horizontal. Similarly for y=-r. So yes, y=r and y=-r are the two parallel tangents.\n\nBut in this case, they are symmetric.\n\nNow, I need points P such that the distance from P to the circle is equal to the distance from P to each of the tangents? But that might not be what it means.\n\nThe problem says "equidistant from a circle and two parallel tangents