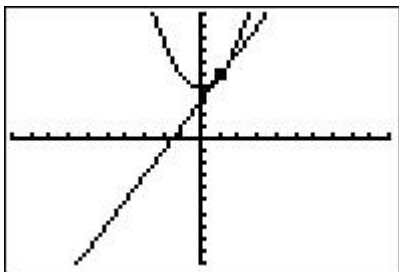


INTERSECTIONS & TANGENTS - ANSWERS

For each problem below, graph the cross-section of the given surface and plane. Next, at the indicated point, find the equation for the tangent line and graph it and the point on the curve of intersection in two dimensions. Label your horizontal and vertical axes appropriately.

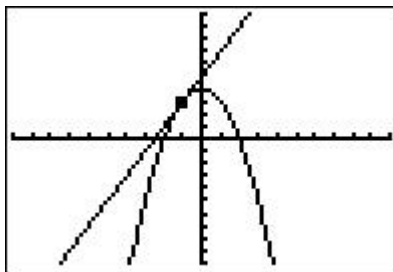
1. $z = f(x, y) = x^2 + y^2$
 $x = 2$
 $P = (1, 5)$

$z = 4 + y^2$
 $z' = 2y$
 $z'(1) = 2$
 $T = 2(y-1) + 5 = 2y + 3$



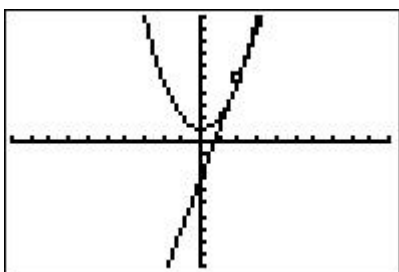
3. $z = f(x, y) = x^2 - y^2$
 $x = 2$
 $P = (-1, 3)$

$z = 4 - y^2$
 $z' = -2y$
 $z'(-1) = 2$
 $T = 2(y+1) + 3 = 2y + 5$



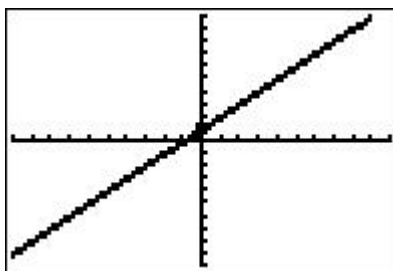
2. $z = f(x, y) = x^2 + y^2$
 $y = 1$
 $P = (2, 5)$

$z = x^2 + 1$
 $z' = 2x$
 $z'(2) = 4$
 $T = 4(x-2) + 5 = 4x - 3$



4. $z = f(x, y) = x + 2y + 3$
 $y = -1$
 $P = (0, 1)$

$z = x + 1$
 $z' = 1$
 $z'(0) = 1$
 $T = 1 \cdot (x - 0) + 1 = x + 1$



(cross-section and tangent coincide)

$$z = f(x, y) = x^2 y^3$$

5. $y = 1$

$$P = (1, 1)$$

$$z = x^2$$

$$z' = 2x$$

$$z'(1) = 2$$

$$T = 2(x-1) + 1 = 2x - 1$$

