$$y = \frac{1}{\sqrt{x}} - \frac{1}{\sqrt[5]{x^3}}$$

$$y = x^{-1/2} - x^{-3/5}$$

$$y' = \frac{-1}{2} x^{-3/2} - \left(\frac{-3}{5}\right) x^{-8/5}$$

$$y' = \frac{-1}{2x^{3/2}} + \frac{3}{5x^{8/5}}$$

$$y = x^2 \sin \pi x$$

$f(x) = x^2 \quad f'(x) = 2x$

$g(x) = \sin \pi x \quad g'(x) = \pi \cos \pi x$

$y' = 2x(\sin \pi x) + x^2(\pi \cos \pi x)$

$u = \pi x$

$u' = \pi$

$f'g + fg'$

$$y = \ln(\sec x)$$

$$y' = \left(\frac{1}{\cancel{\sec x}}\right)(\cancel{\sec x}\tan x)$$

$$\boxed{y' = \tan x}$$

$$u = \sec x$$

$$u' = \sec x \tan x$$

$$y(u) = \ln u$$

$$y'(u) = \frac{1}{u}$$

$$y = (1 - x^{-1})^{-1}$$

$$u = 1 - x^{-1}$$

$$u' = x^{-2}$$

$$y(u) = u^{-1}$$

$$y'(u) = -1u^{-2}$$

$$y' = -(x^{-2})(1 - x^{-1})^{-2}$$

$$y' = \left(\frac{-1}{x^2}\right)\left(\frac{1}{(1-x^{-1})^2}\right)$$

$$\left(1 - \frac{1}{x}\right)^2 \to \left(\frac{x-1}{x}\right)^2 = \frac{(x-1)^2}{x^2}$$

$$y' = \left(\frac{-1}{x^2}\right)\left(\frac{1}{\frac{(x-1)^2}{x^2}}\right)$$

$$\frac{(x^2+1)^4}{(2x+1)^3(3x-1)^5}$$

$f(x) = (x^2+1)^4$

$f'(x) = 4(x^2+1)^3(2x)$

$g(x) = \boxed{(2x+1)^3}\boxed{(3x-1)^5}$

$3(2x+1)^2(2)$ $\qquad$ $5(3x-1)^4(3)$

$6(2x+1)^2$ $\qquad$ $15(3x-1)^4$

$g'(x) = 6(2x+1)^2(3x-1)^5 +$

$15(3x-1)^4(2x+1)^3$

$$\ln y = \ln (x^2+1)^4 - \ln (2x+1)^3 - \ln (3x-1)^5$$

$$\ln y = 4 \ln (x^2+1) - 3 \ln (2x+1) - 5 \ln (3x-1)$$

$$\frac{1}{y} y' = \frac{4(2x)}{x^2+1} - \frac{3(2)}{2x+1} - \frac{5(3)}{3x-1}$$

$$y' = y \left(\frac{8x}{x^2+1} - \frac{6}{2x+1} - \frac{15}{3x-1} \right)$$

$$y' = \left(\frac{(x^2+1)^4}{(2x+1)^3(3x-1)^5} \right) \left(\frac{8x}{x^2+1} - \frac{6}{2x+1} - \frac{15}{3x-1} \right)$$

$$y = \ln\left|\sec 5x + \tan 5x\right|$$

$$u = \sec \boxed{5x} + \tan \boxed{5x}$$

$$u' = 5(\sec 5x)(\tan 5x)$$
$$+ 5(\sec^2 5x)$$

$$y' = \frac{5\sec 5x \tan 5x + 5\sec^2 5x}{\sec 5x + \tan 5x}$$

$$y' = \frac{5\sec 5x(\tan 5x + \sec 5x)}{\sec 5x + \tan 5x}$$

$$y' + \frac{y'}{y} = y^2 + 2xyy'$$

$$y' + \frac{y'}{y} - 2xyy' = y^2$$

$$y'\left(1 + \frac{1}{y} - 2xy\right) = y^2$$

$$\boxed{y' = \frac{y^2}{1 + \frac{1}{y} - 2xy}}$$

$$y' = \frac{y^3}{y + 1 - 2xy^2}$$

61 Find an equation of the tangent line to the curve at the given point.

61. $y = 4\sin^2 x, \quad (\pi/6, 1)$

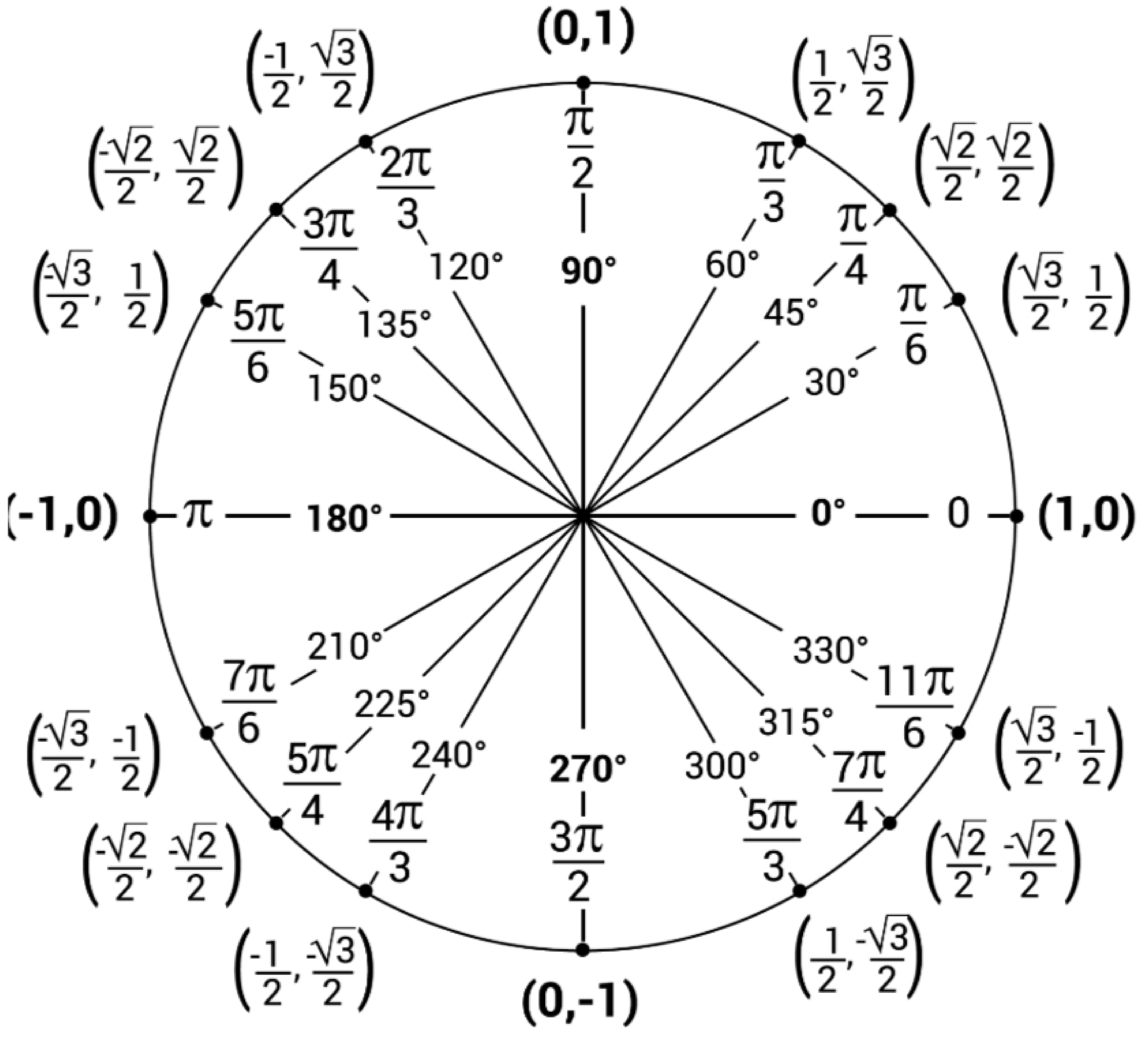
$(\sin x)^2$

$u = \sin x$

$u' = \cos x$

$y = 4u^2$

$y' = 8uu'$



$y' = 8(\sin x)(\cos x)$

$y'(\pi/6) = 8\left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$

$y' = 2\sqrt{3}$

$y - y_1 = m(x - x_1)$

$$\boxed{y - 1 = 2\sqrt{3}\left(x - \pi/6\right)}$$

If $f(x) = (x - a)(x - b)(x - c)$, show that

$$\frac{f'(x)}{f(x)} = \frac{1}{x - a} + \frac{1}{x - b} + \frac{1}{x - c}$$

ind a parabola $y = ax^2 + bx + c$ that passes through the oint (1, 4) and whose tangent lines at $x = -1$ and $x = 5$ ave slopes 6 and -2, respectively.

$$y' = 2xa + b$$

$$6 = -2a + b$$

$$+2 = -10a + b$$

$$8 = -12a$$

$$\frac{8}{-12}$$

$$a = -\frac{2}{3}$$

$$6 = 2(-1)a + b$$

$$-2 = 2(5)a + b$$

$$6 = -2\left(-\frac{2}{3}\right) + b$$

$$6 = \frac{4}{3} + b$$

$$\frac{14}{3} = b$$

$$4 = \left(-\frac{2}{3}\right)(1)^2 + \frac{14}{3}$$

$$4 = -\frac{2}{3} + \frac{14}{3}$$

$$4 = 4 + C$$

$$-4 \quad -4$$

$$0 = C$$

$$y = -\frac{2}{3}x^2 + \frac{14}{3}x$$