1. Suppose \( f(x) = (x^2 - \pi^2) \cos(x) \).

   (a) \[ f'(x) = \frac{d}{dx} [x^2 - \pi^2] \cdot \cos(x) + (x^2 - \pi^2) \cdot \frac{d}{dx} [\cos(x)] \\
       = (2x) \cos(x) + (x^2 - \pi^2) \cdot (-\sin(x)) \\
       = 2x \cos(x) - (x^2 - \pi^2) \sin(x) \]

   (b) Find the equation of the tangent line to the graph of \( f(x) \) at the point \((\pi, f(\pi))\). \( f'(\pi) = \frac{d}{dx} [\cos(x)] \mid_{x=\pi} \]

   The slope of the line is \( f'(\pi) = 2\pi \cos(\pi) - (x^2 - \pi^2) \sin(\pi) = -2\pi \cdot 0 = -2\pi \).

   Using the point-slope formula for the equation of a straight line, we get

   \[ y - y_0 = m(x - x_0) \]
   \[ y - 0 = -2\pi(x - \pi) \]
   \[ y = -2\pi x + 2\pi^2 \]

   Answer: \( y = -2\pi x + 2\pi^2 \)

2. If \( z = \frac{5}{w} + \tan(w) \), then \( \frac{dz}{dw} = \)

   \[ \frac{dz}{dw} = -5w^{-2} + \frac{\sec^2(w)(w+1) - \tan(w) \cdot 1}{(w+1)^2} = -\frac{5 \tan(w) - (w+1) \sec^2(w)}{(w+1)^2} \]

Answer: \( y = -2\pi x + 2\pi^2 \)

1. Suppose \( f(x) = \frac{\sin(x)}{x} \).

   (a) \[ f'(x) = \frac{d}{dx} [\sin(x)] \cdot x - \sin(x) \cdot \frac{d}{dx} [x] = \frac{\cos(x) \cdot x - \sin(x) \cdot 1}{x^2} = \frac{x \cos(x) - \sin(x)}{x^2} \]

   (b) Find the equation of the tangent line to the graph of \( f(x) \) at the point \((\pi, f(\pi))\). \( f'(\pi) = \frac{\sin(\pi)}{\pi} = (\pi, 0) \)

   The slope of the line is \( f'(\pi) = \frac{\pi \cos(\pi) - \sin(\pi)}{\pi^2} = \frac{\pi(-1) - 0}{\pi^2} = -\frac{\pi}{\pi^2} = -\frac{1}{\pi} \).

   Using the point-slope formula for the equation of a straight line, we get

   \[ y - y_0 = m(x - x_0) \]
   \[ y - 0 = -\frac{1}{\pi}(x - \pi) \]
   \[ y = -\frac{1}{\pi}x + 1 \]

   Answer: \( y = -\frac{1}{\pi}x + 1 \)

2. If \( z = \sqrt{w} + 5(w+1) \sec(w) \), then \( \frac{dz}{dw} = \)

   \[ \frac{dz}{dw} = \frac{1}{2} w^{-1/2} + 5 \sec(w) + 5(w+1) \sec(w) \tan(w) = \frac{1}{2\sqrt{w}} + 5 \sec(w) + 5(w+1) \sec(w) \tan(w) \]

Answer: \( y = -\frac{1}{\pi}x + 1 \)