

### Solution and Rubric for Quiz 7 (Fri Oct 17)

**Problem:** Find the tangent line to  $y = \cot^{-1}(x)$  at  $x = \sqrt{3}$ . Write your answer in slope-intercept form ( $y = mx + b$ ).

**Solution:** The derivative is

$$\frac{dy}{dx} = \frac{d}{dx} \cot^{-1}(x) = \frac{-1}{1+x^2}$$

so the slope of the tangent line is

$$m = \left. \frac{dy}{dx} \right|_{x=\sqrt{3}} = \frac{-1}{1+3} = -\frac{1}{4}.$$

Since  $\cot^{-1}(\sqrt{3}) = \frac{\pi}{6}$ , the equation of the tangent line is

$$y - \frac{\pi}{6} = -\frac{1}{4}(x - \sqrt{3}).$$

The slope-intercept form of this equation is:

$$y = -\frac{1}{4}x + \left( \frac{\sqrt{3}}{4} + \frac{\pi}{6} \right)$$

**Rubric:**

- If the correct final answer is given in slope-intercept form, and is fully supported by clear and correct work (including a formula for the derivative of  $\cot^{-1}(x)$ ): 2 points
- Otherwise, if at least one of the following was computed correctly,
  - Slope  $m = -\frac{1}{4}$
  - $\cot^{-1}(\sqrt{3}) = \frac{\pi}{6}$then: 1 point
- Otherwise: 0 points