1. Goal: Understand and use the rule below:

2. Fill out the rows of the chart below. Start with asterisked rows.

(a) $f(x) = x^3$

|   | $f(x)$ | $f'(x)$ | $a$-value | $b = f(a)$ | $f'(a)$ | point: $(a, b)$ | slope at $(a, b)$ |
|---|---|---|---|---|---|---|---|
| * | $f(x) = x^3$ |  | 2 |  |  |  |  |

|   | $f^{-1}(x)$ | $(f')^{-1}(x)$ | $b$-value | $a = f^{-1}(b)$ | $(f^{-1})'(b)$ | point: $(b, a)$ | slope at $(b, a)$ |
|---|---|---|---|---|---|---|---|
|   |  |  |  |  |  |  |  |

(b) $f(x) = \sin(x)$

|   | $f(x)$ | $f'(x)$ | $a$-value | $b = f(a)$ | $f'(a)$ | point: $(a, b)$ | slope at $(a, b)$ |
|---|---|---|---|---|---|---|---|
| * | $f(x) = \sin(x)$ |  |  |  |  |  |  |

|   | $f^{-1}(x)$ | $(f')^{-1}(x)$ | $b$-value | $a = f^{-1}(b)$ | $(f^{-1})'(b)$ | point: $(b, a)$ | slope at $(b, a)$ |
|---|---|---|---|---|---|---|---|
|   |  |  | $\sqrt{3}/2$ |  |  |  |  |

3. Use the rule from (1) to find a formula for the derivative of $g(x) = \sin^{-1}(x)$.

4. Rules for the arccosine and arctangent functions.

5. Find the derivatives for each function below.

   (a) $f(x) = \cos^{-1}(\sqrt{x})$

   (b) $f(x) = \left(\tan^{-1}(x)\right)^2$

   (c) $f(x) = x \sin^{-1}(x)$

   (d) $f(x) = \tan^{-1}\left(\frac{1}{x}\right)$

3-7 Derivatives of $f^{-1}$