

### Topic 3.3 – Derivatives of Inverse Functions

In 1 – 7, find the derivative of  $f^{-1}$  for the function at the specified value of  $x$ . Use “Method #2” or the formula  $(f^{-1})'(x) = \frac{1}{f'(f^{-1}(x))}$ . No Calculator, use guess and check to find any missing values.

- $f(x) = x^3 + 2x - 1$  at  $x = 2$
- $f(x) = 2x^5 + x^3 + 1$  at  $x = 4$
- $f(x) = \sin x, -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$  at  $x = \frac{1}{2}$
- $f(x) = \cos 2x, -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$  at  $x = 1$
- $f(x) = x^3 - \frac{4}{x}, x > 0$  at  $x = 6$
- $f(x) = x \ln(3x - 5)$  at  $x = 0$
- Find  $(f^{-1})'(-3)$  if  $f(x) = \sqrt[3]{3x - 5}$

8. Find  $(f^{-1})'(-3)$  given the table of values of a **strictly monotonic function** (Google the definition) and its derivative.

| $x$ | $f(x)$ | $f'(x)$ |
|-----|--------|---------|
| -3  | 5      | 6       |
| 8   | -3     | -2      |

9. Selected values of a strictly monotonic function and its derivative are shown on the table below.

Let  $f(x)$  be a function such that  $f(x) = h^{-1}(x)$ . Find  $f'(-1)$ .

|         |    |               |               |   |
|---------|----|---------------|---------------|---|
| $x$     | -1 | 0             | 2             | 4 |
| $h(x)$  | -5 | -1            | 4             | 7 |
| $h'(x)$ | 3  | $\frac{1}{2}$ | $\frac{1}{6}$ | 5 |

10. Selected values of a strictly monotonic function and its derivative are shown on the table below.

Let  $f(x)$  be a function such that  $f(x) = h^{-1}(x)$ . Find  $f'(4)$

|         |    |               |               |   |
|---------|----|---------------|---------------|---|
| $x$     | -1 | 0             | 2             | 4 |
| $h(x)$  | -5 | -1            | 4             | 7 |
| $h'(x)$ | 3  | $\frac{1}{2}$ | $\frac{1}{6}$ | 5 |