12.3) Differentiating $x^{n}$

Differentiate with respect to $x$ :
$x^{2}$
$x^{3}$
$x^{4}$

Differentiate with respect to $x$ : $x^{5}$
$5 x^{4}$

Differentiate with respect to $x$ :
$3 x^{2}$

$$
-3 x^{5}
$$

$$
-15 x^{4}
$$

$-2 x^{3}$

$$
5 x^{4}
$$

Differentiate with respect to $x$ :
$\sqrt{x}$
$\sqrt[3]{x}$
$\sqrt[4]{x}$

Differentiate with respect to $x$ :
$\sqrt[5]{x}$
$\frac{1}{5} x^{-\frac{4}{5}}$

Differentiate with respect to $x$ :
$\frac{1}{x}$

$$
\frac{1}{x^{2}}
$$

$$
\frac{1}{x^{3}}
$$

Differentiate with respect to $x$ :

$$
\begin{gathered}
\frac{1}{x^{4}} \\
-4 x^{-5}=-\frac{4}{x^{5}}
\end{gathered}
$$

Differentiate with respect to $x$ :
$\frac{2}{x}$
$\frac{3}{4 x^{2}}$

$$
\frac{6}{5 x^{3}}
$$

Differentiate with respect to $x$ :

$$
\begin{gathered}
\frac{7}{8 x^{4}} \\
-\frac{7}{2} x^{-5}=-\frac{7}{2 x^{5}}
\end{gathered}
$$

Differentiate with respect to $x$ :
$\frac{2}{3} \sqrt{x}$
$\frac{4}{7} \sqrt[3]{x}$
$\frac{5}{6} \sqrt[4]{x}$

Differentiate with respect to $x$ :

$$
\begin{gathered}
\frac{3}{5} \sqrt{x} \\
\frac{3}{10} x^{-\frac{1}{2}}=\frac{3}{10 \sqrt{x}}
\end{gathered}
$$

Differentiate with respect to $x$ :

$$
\begin{aligned}
& \frac{2}{3 \sqrt{x}} \\
& \frac{4}{7 \sqrt[3]{x}} \\
& \frac{5}{6 \sqrt[4]{x}}
\end{aligned}
$$

Differentiate with respect to $x$ :

$$
\begin{gathered}
\frac{3}{5 \sqrt{x}} \\
-\frac{3}{10} x^{-\frac{3}{2}}=-\frac{3}{10 x \sqrt{x}}
\end{gathered}
$$

## Your turn

Differentiate with respect to $x$ :
$\sqrt{36 x^{7}}$
$\sqrt{25} x^{7}$

Differentiate with respect to $x$ :

$$
\begin{gathered}
\sqrt{16 x^{8}} \\
16 x^{3}
\end{gathered}
$$

$\sqrt{9} x^{8}$
$24 x^{7}$

