Differentiation practice II

■ 1 **Compute the derivative.**

```
f[x_] = x^5 + π x^(1/7)
∂x f[x]
```

■ 2 **Compute the derivative.**

```
f[x_] = x^3 + 3 (x^2 + π^2)
∂x f[x]
```

■ 3 **Compute the derivative.**

```
f[x_] = (x + 1)^2 (x^3 - 5)
∂x f[x]
Expand[%]
```

■ 4 **Compute the derivative.**

```
f[θ_] = (θ^2 + Sec[θ] + 1)^3
∂θ f[θ]
```

- **5 Compute the derivative.**

```
f[t_] = Sqrt[t]/(1 + Sqrt[t])
∂t f[t]
Together[%]
```

$$f[t\_] = \frac{\sqrt{t}}{1+\sqrt{t}}$$

- **6 Compute the derivative. Remark: the traditional way of writing this function would be**

$f(x) = 2\tan^2(x) - 2\sec^2(x)$

```
f[x_] = 2 Tan[x]^2 - 2 Sec[x]^2
∂x f[x]
```

7 Compute the derivative. The traditional way of writing this function would be

$$\frac{1}{\sin^2(x)} - \frac{\pi}{\sin(2\pi x)}$$

```
f[x_] := 1/Sin[x]^2 - π/Sin[2 π x]
∂x f[x]
```

- **8 Compute the derivative. The traditional way of writing this function would be**

$$\cot^3\left(\frac{2}{t^2}\right)$$

```
f[x_] := Cot[2/t^2]^3
∂t f[t]
```

■ **9 Compute the derivative.**

```
f[θ_] = Sin[√(2 θ)]
∂θ f[θ]
```

■ **10 Compute the derivative.**

```
f[x_] = 1/2 x^2 Cot[x]^2
∂x f[x]
```

■ **11 Compute the derivative. The traditional form of the function would be**

$$\sqrt{x}\ 2 \csc((x+1)^3)$$

```
f[x_] := √x 2 Csc[(x + 1)^3]
∂x f[x]
```

■ **12 Compute the derivative. The traditional form of the function would be**

$$\sqrt{x}\ 2 \csc^3(x+1)$$

```
f[x_] = √x 2 Csc[x + 1]^3
∂x f[x]
```

■ 13 Compute the derivative. The tradtional form of the function woud be

$$\frac{\sin^2(x^3)}{x^2}$$

```
f[x_] = Sin[x^3]^2 / x^2
∂x f[x]
```

■ **14 Compute the derivative.**

```
f[θ_] = Sin[θ] / (Cos[θ] + 1)
∂θ f[θ]
Together[%]
```

$$f[\theta\_] = \frac{\mathrm{Sin}[\theta]}{\mathrm{Cos}[\theta] + 1}$$

■ **15 Compute the derivative.**

$$f[\theta\_] = \frac{\mathrm{Sin}[\pi / 2]\ \mathrm{Sin}[\theta]}{\mathrm{Cos}[\theta] + 1}$$

```
∂θ f[θ]
```

■ **16 Compute the derivative.**

$$f[x\_] := \mathrm{Sin}[x] \sqrt{x^2 + 1}\ e^x$$

```
∂x f[x]
```

■ **17 Compute the derivative.**

$$f[x\_] = \mathrm{Cos}\left[e^{x^2}\right]$$

```
∂x f[x]
```

■ **18 Compute the derivative.**

$$f[x\_] = \frac{\mathrm{Sin}[e\, x]}{x^2}$$

```
∂x f[x]
Together[∂x f[x]]
```

■ **19 Compute the derivative. The traditional form would be**

$$\frac{\sin^2(e\, x)}{x^2}$$

```
f[x_] = Sin[ⅇ x]^2 / x^2
∂x f[x]
```

■ **20 Compute the derivative.**

```
f[x_] = Log[ⅇ^x];
∂x f[x]
```

■ **21 Compute the derivative.**

```
f[x_] = Tan[ Log[x]];
∂x f[x]
```

■ **22 Compute the derivative.**

```
f[x_] = Cos[x]/x + x/Cos[x]
∂x f[x]
Together[%]
```

■ **23 Compute the derivative.**

```
f[x_] = (1 + Csc[x])/(1 - Csc[x])
∂x f[x]
Together[%]
```

- **24 Compute the derivative. Log[10,x] means log base 10 of x.**

```
f[x_] = Log[10, x^3];
∂x f[x]
```

- **25 Compute the derivative.**

```
f[x_] = A ⅇ^(-α x) + A ⅇ^(β x)
∂x f[x]
```