## SOLUTIONS

[There are, of course, many equivalent formulations.]

1. Find the derivative of $\ln\left(\sin\left(e^{-5u} + 7\right)\right)$

$$\frac{[\cos(e^{-5u} + 7)](-5e^{-5u})}{\sin(e^{-5u} + 7)} \quad \text{or} \quad (-5e^{-5u})\cot(e^{-5u} + 7)$$

2. Find the derivative of $\dfrac{e^{4t} + 2t}{\ln(\cos(t))}$

$$\frac{(4e^{4t} + 2)[\ln(\cos(t))] - (e^{4t} + 2t)(-\frac{\sin(t)}{\cos(t)})}{[\ln(\cos(t))]^2}$$

3. Find the derivative of $(8\sqrt{u} + 6)\sin(4u)$

$$(8\frac{1}{2\sqrt{u}})\sin(4u) + (8\sqrt{u} + 6)(4\cos(4u))$$

4. Find the derivative of $\dfrac{x^4 \cos(x)}{x^3 - 5x}$

$$\frac{[4x^3\cos(x) + x^4(-\sin(x))](x^3 - 5x) - [x^4\cos(x)](3x^2 - 5)}{(x^3 - 5x)^2}$$

5. Find the derivative of $4 + e^{-u} + 2\sin^{-1}(u) - 4u^{-3}$

$$-e^{-u} + 2\frac{1}{\sqrt{1 - u^2}} - 4(-3u^{-4})$$

N.B. Using $\cos(\sin^{-1}(u))$ for $\sqrt{1 - u^2}$ is an acceptable alternative.

6. Find the derivative of $\dfrac{6w^2 - 5}{4e^{-3w} + 5w}$

$$\dfrac{(6(2w))(4e^{-3w} + 5w) - (6w^2 - 5)(4(-3e^{-3w}) + 5)}{(4e^{-3w} + 5w)^2}$$

7. Find the derivative of $\sqrt{w^5 - 7}$

$$\dfrac{1}{2\sqrt{w^5 - 7}}(5w^4) \quad \text{or} \quad \tfrac{1}{2}(w^5 - 7)^{-\frac{1}{2}}(5w^4)$$

8. Find the derivative of $x^2 e^{x^2}$

$$(2x)e^{x^2} + x^2[e^{x^2}(2x)]$$

9. Find the derivative of $\left(e^w \ln(w) - 8w^2\right)^7$

$$7(e^w \ln(w) - 8w^2)^6[(e^w \ln(w) + e^w \tfrac{1}{w}) - 8(2w)]$$

10. Find $\dfrac{dy}{dx}$ for $\cos\left(y^4 + x^5\right) = x^6$

$$\left\{ [-\sin(y^4 + x^5)][4y^3\dfrac{dy}{dx} + 5x^4] = 6x^5, \text{ so } [-\sin(y^4 + x^5)](4y^3)\dfrac{dy}{dx} = 6x^5 + [\sin(y^4 + x^5)](5x^4), \text{ so } \right\}$$

$$\dfrac{dy}{dx} = \dfrac{6x^5 + [\sin(y^4 + x^5)](5x^4)}{[-\sin(y^4 + x^5)](4y^3)}$$