

DIFFERENTIATION WORKSHEET III SOLUTIONS
(the chain rule)

Find the following derivatives:

$$(1) (e^{\sin(x)})' = e^{\sin(x)} \cos(x)$$

$$(2) (\cos(e^x - 4x + 5))' = -\sin(e^x - 4x + 5)(e^x - 4)$$

$$(3) ((20x + 5)^{10})' = 10(20x + 5)^9 \cdot 20 = 200(20x + 5)^9$$

$$(4) (\sqrt{x^3 + x})' = \frac{1}{2}(x^3 + x)^{-1/2}(3x^2 + 1)$$

$$(5) (\sin(\cos(x)))' = \cos(\cos(x)) \cdot (-\sin(x)) = -\sin(x) \cos(\cos(x))$$

$$(6) (x \cos(5x + 1))' = 1 \cdot \cos(5x + 1) - x \cdot \sin(5x + 1) \cdot 5$$

$$(7) \left(\frac{e^{4x}}{\sin(5x)} \right)' = \frac{4e^{4x} \sin(5x) - e^{4x} \cdot 5 \cos(5x)}{\sin^2(5x)}$$

$$(8) (e^{\cos(x^2)})'. \text{ Then } (e^{\cos(x^2)})' = e^{\cos(x^2)} \cdot (\cos(x^2))' = e^{\cos(x^2)} \cdot (-\sin(x^2)) \cdot 2x$$