School of Mathematics  
MATH 0111  
Elementary Differential Calculus

Examples 9 – Inverse Trig Functions, Implicit Differentiation, Logs again

These examples count towards the assessment of the module and should be handed in on Monday 8th December. Do not use a calculator.


1. Find (a) \( \arcsin \left( \frac{\sqrt{3}}{2} \right) \), (b) \( \arccos(0) \), (c) \( \arctan(-\sqrt{3}) \).

2. Differentiate the following with respect to \( x \):
   
   (a) \( y = \frac{\cos x}{x^2 + 4} \),  
   (b) \( y = \arcsin(3x - 1) \),
   
   (c) \( y = \tan(x^4) + \arctan \left( \frac{1}{x} \right) \),  
   (d) \( y = (4x - 7) \arccos(1 - x^2) \).

3. Find the following:
   
   (a) \( \log_3 27 \),  
   (b) \( \log_2 \sqrt{8} \),  
   (c) \( \log_{16} 2 \),
   
   (d) \( \log_{10} 0.01 \),  
   (e) \( \log_7 1 \),  
   (f) \( \log_{2002} 2002 \).

See overleaf for practice examples . . .
PRACTICE EXERCISES, NOT TO BE HANDED IN

1. Find (a) arcsin \( \frac{1}{2} \), (b) arccos \( \frac{1}{\sqrt{2}} \), (c) arctan(−1).

2. Differentiate the following with respect to \( x \):
   (a) \( y = \frac{\sin x}{x^2} \),
   (b) \( y = \sin((x^2 + 1)^{1/2}) + \arctan(x^2 + 1) \),
   (c) \( y = \arcsin(x^3) \),
   (d) \( y = x^2 \arccos(2x + 1) \).

3. Find the following:
   (a) \( \log_{10} 10000 \), (b) \( \log_2 256 \), (c) \( \log_3 \left( \frac{1}{81} \right) \),
   (d) \( \log_{81} 3 \), (e) \( \log_5 5 \).