Name:

1. (5 points) Consider the curve given by the equation:

$$\arcsin x + \arctan y = \frac{\pi}{2}$$

Find the gradient of the curve when $x = \frac{1}{2}$.

2. (5 points) Consider the tangent to the graph of $y = \dfrac{1}{x}$ at $x = a$ for $a > 0$. Show that the area of the triangle enclosed by this tangent and the axes is independent of a and calculate this area.

3. (5 points)
   (a) Show that

$$\sin(\arccos x) = \sqrt{1 - x^2}$$

   (b) Show that

$$\sin(2\arccos x) = 2x\sqrt{1 - x^2}$$

   (c) Hence or otherwise solve:

$$\sin(\arccos x) = \sin(2\arccos x)$$

4. (5 points) Consider the polynomial equation:

$$2x^3 + Ax^2 + Bx + C = 0$$

$\frac{1}{2}$ and $2 + 3i$ are solutions to this equation.

(a) Write down the third solution.

(b) Find A, B and C.

(c) Find solutions to the equation:

$$2 + Ax + Bx^2 + Cx^3 = 0$$