Written HW2 – MATH 2502 Spring 2022
Due by 25 January for timely completion credit

In class, we derived the formula $\dfrac{\mathrm{d}}{\mathrm{d}x}\arctan(x) = \dfrac{1}{1+x^2}$ using basic trigonometry. In this homework, you will carry out the derivation of

$$\frac{\mathrm{d}}{\mathrm{d}x}\arcsin(x) = \frac{1}{\sqrt{1-x^2}}.$$

(1) Define $u = \arcsin(x)$ and solve for x.

(2) Take the derivative with respect to x of both sides of the equation you obtained in (1) (*note: the chain rule will be required! pay attention to the variables*). Solve this equation for $\dfrac{\mathrm{d}u}{\mathrm{d}x}$.

(3) Draw a **right** triangle corresponding to the equation you found in (1) and label its sides appropriately (*note: "u" should be an angle here*).

(4) Use the basic definitions of trigonometric functions to determine the value of the trigonometric function appearing in your answer to (2), in terms of the variable x.

(5) Substitute the value found in (4) into the equation found in (2) to obtain $\dfrac{\mathrm{d}}{\mathrm{d}x}\arcsin(x)$ in terms of x.