CAMOSUN

Name: _____

Mark: ____/25

MATH 101 (Fall, 2026)

Test 1

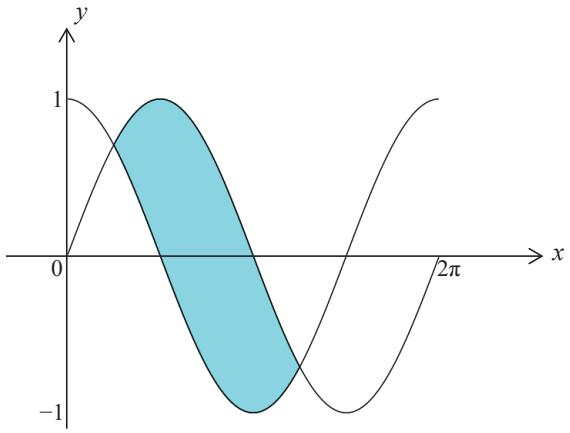
1. (3 marks) Evaluate the definite integral $\displaystyle\int_4^6 \frac{dx}{\sqrt{-x^2+8x}}$.

2. (3 marks) Differentiate $f(x) = \operatorname{arcsec}(\cosh x)$, assuming $x > 0$, and simplify your answer.

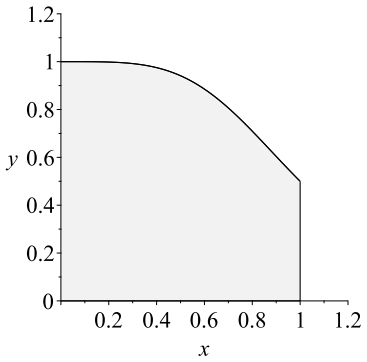
3. (3 marks) By first converting hyperbolic functions to exponential form, simplify the expression

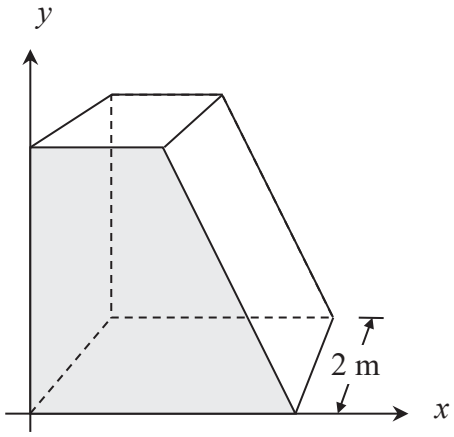
$$\frac{\sinh(\ln x) + \cosh(\ln x)}{\ln(\sinh x + \cosh x)}.$$

4. (4 marks) Find the area of the shaded region between the curves $y = \sin x$ and $y = \cos x$.



5. (4 marks) Use the shell method to find the volume of the solid formed by revolving the region bounded by the curves $y = \dfrac{1}{1+x^4}$ and $y = 0$ for $0 \le x \le 1$ (as illustrated) about the y-axis.



6. (2 marks) Find the arc length of the curve $y = -\dfrac{3}{4}x + 2$ for $0 \le x \le 4$.

7. (6 marks) Each end of a tank is in the shape of the trapezoidal region (shown shaded in the illustration below) bounded by the lines $y = 4$, $y = -2x + 8$, and the coordinate axes, where x and y are measured in meters. The length of the tank is 2 meters and the bottom of the tank is sitting on the ground. If the tank is full of brine, which weighs 12,000 N/m^3, then how much work is required to empty the tank by pumping all the brine up and out through a hole at the top of the tank?