A giant snowdrift has formed on the Quad! Its cross section matches the function $\sin(x)$ from 0 to $\pi$.

1) Sketch the tangent line to the curve $y = \sin(x)$ at the point $P = (2\pi/3, \sqrt{3}/2)$. What does the slope of the tangent line at $P$ represent, in terms of the snowdrift?

3) Approximate the slope of the tangent at $P$ using a collection of secant lines as follows:

   (a) Plot the point $Q_1 = (\pi/2, 1)$ on the graph and sketch the secant line $PQ_1$.

   (b) The slope of secant line $PQ_1$ has been determined for you as an example, using the chart above. Review this calculation and ask if you have questions.

   (c) Choose a new point, $Q_2$, that is closer to $P$ than $Q_1$. Plot it on the graph and sketch the new secant line $PQ_2$.

   (d) Use the chart to calculate the slope of $PQ_2$.

   (e) Repeat steps (c) and (d) for a third point, $Q_3$, that is really, really close to $P$.

   (f) What limiting value does the slope of $PQ$ seem to approach as $Q$ approaches $P$? (This is, loosely speaking, the slope of the tangent at $P$.)
4) Would you find a different limiting value for the slope of $PQ$ if $Q$ approached $P$ from the right? (You can try this if you have time.)

5) Instead of choosing actual numbers for the coordinates of $Q$, let $Q = (x, \sin(x))$. Write an expression for the slope of secant line $PQ$ in terms of $x$. 