

Name: _____ / 25

There are 25 points possible on this quiz. *You should be able to complete it without using your notes or textbook – this is practice for your exams!* If you needed to look something up, you might want to come talk to me about questions you might have. **Show all work for full credit** and use some words or sentences to help communicate your answers.

1. [11 points] The point $P = (2, 1)$ is a point on the graph of $f(x) = \frac{x}{3-x} - 1$.

- a. Find the slope of the secant line passing through P and the point $Q = (0, f(0))$. Show some work.

Slope = _____

- b. Find the slope of the secant line passing through P and the point $R = (1, f(1))$. Show some work.

Slope = _____

- c. The table below lists the slope of the secant line passing through the point P and the point $S = (x, f(x))$ for several values of x . The value m_{sec} is the slope of the secant line.

x	1.9	1.99	1.999	2.001	2.01	2.1
$f(x)$	0.727273	0.970297	0.997003	1.003	1.0303	1.33333
m_{sec}	2.72727	2.97030	2.99700	3.00300	3.03030	3.33333

Use the information in the table to estimate the slope of the tangent line to $f(x)$ at the point $P = (2, 1)$.

Tangent line slope = _____

- d. Use the slope from part (c) above to write an equation of the tangent line at point $P = (2, 1)$. You may write the equation of the line in whatever form you choose.

Tangent line equation: _____

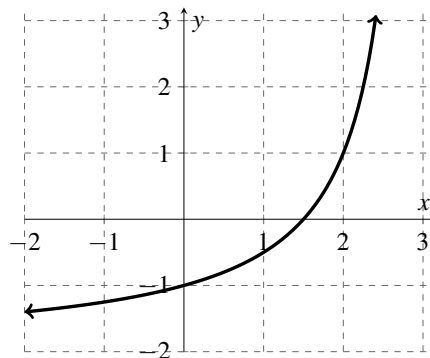
e.

To the right is a sketch of part of the graph of

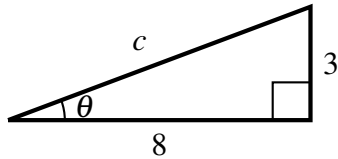
$$f(x) = \frac{x}{3-x} - 1.$$

Sketch and label the **tangent** line to the graph at the point $P = (2, 1)$.

Sketch and label the **secant** line between $P = (2, 1)$ and $Q = (0, f(0))$.



2. [2 points] Use the right triangle below, with side lengths 8, 3 and missing value c , to evaluate the expressions. Give your answers as exact numbers.



a. $\tan(\theta) =$

b. $\sec(\theta) =$

3. [8 points] Evaluate the expressions below. Assume all angles are measured in radians.

a. $\sin(4\pi/3) =$

b. $\cos(\pi/2) =$

c. $\tan(7\pi/6) =$

d. $\sin(-\pi/4) =$

4. [4 points] An athlete is running along a straight path. The position of the athlete is given by $d(t) = \frac{1}{2}t^2 + t$, where t is time measured in seconds and d is distance measured in meters. Find the average velocity of the athlete between $t = 2$ and $t = 5$. Include units with your answer.