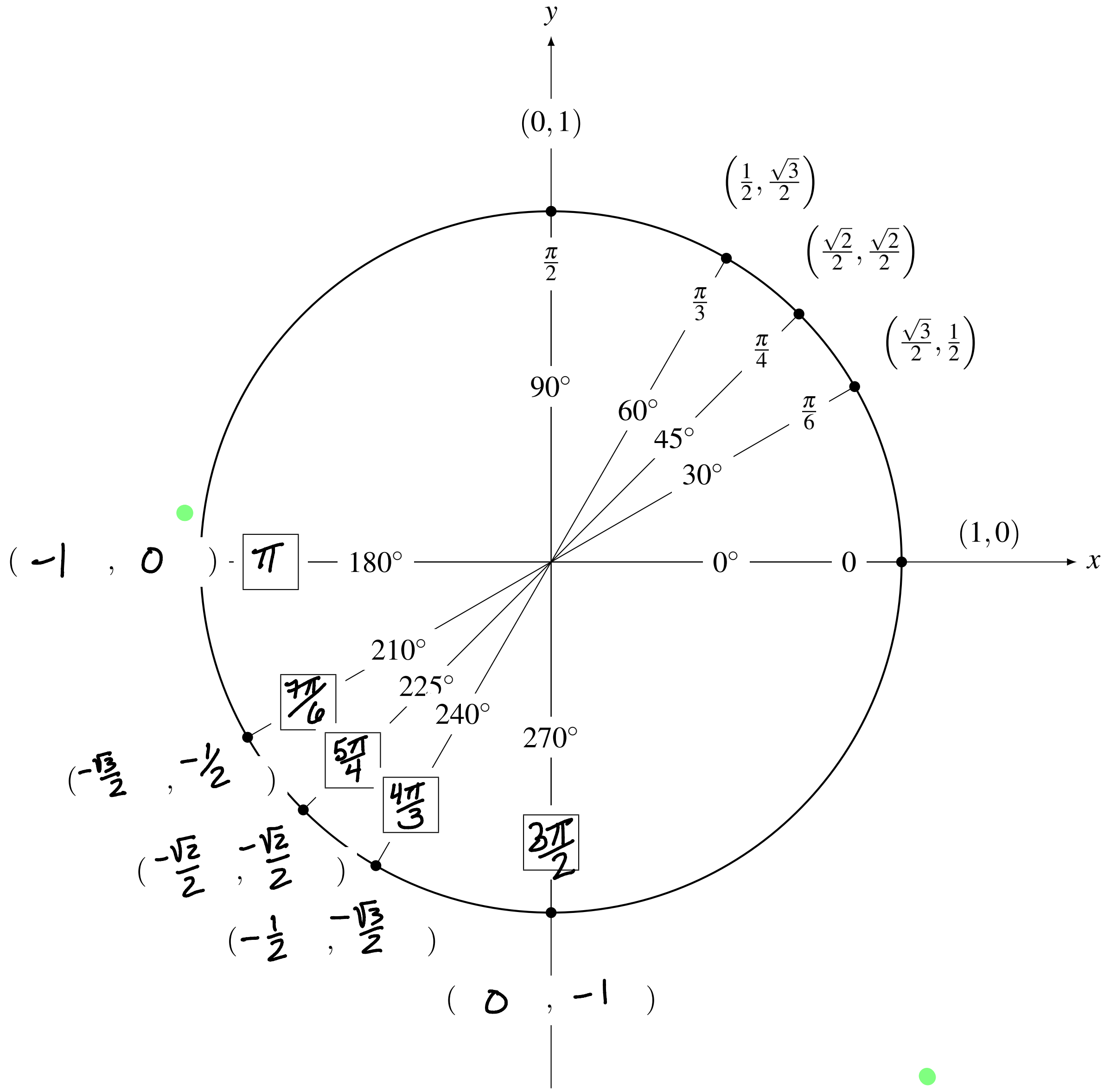
Name: Solutions ______ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [10 points] Trigonometry Questions

a. In the figure of the unit circle below, the details for Quadrant 1 have been provided. Fill in the remaining details for Quadrant 3. Specifically, you must fill in **FIVE** boxes indicating angles in radian and **FIVE** ordered pairs of points.



b. Evaluate the trigonometric functions. Assume all angles are in radians. Simplify.

$\sin(\frac{3\pi}{2}) = -1$

$\tan(7\pi/6) = \dfrac{\sin(\frac{7\pi}{6})}{\cos(\frac{7\pi}{6})} = \dfrac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \dfrac{1}{\sqrt{3}} = \dfrac{\sqrt{3}}{3}$

2. **[4 points]** A moose is spotted running down the middle of Yukon Drive. The position of the moose in the first 5 seconds is modeled by $d(t) = t^2$, where t is time measured in seconds and d is distance measured in meters. Find the average velocity of the moose between $t = 3$ and $t = 5$. Include units with your answer.

$$\text{avg vel} = \frac{\Delta d}{\Delta t} = \frac{d(5)-d(3)}{5-3} = \frac{5^2-3^2}{2} = \frac{25-9}{2} = \frac{16}{2} = 8 \text{ m/s}$$

3. **[11 points]** Let $g(x) = \frac{12}{x+1}$. Observe that $P(1,6)$ is a point on the graph of $g(x)$.

a. Find the slope of the secant line passing through P and the point $Q(3, g(3))$.

$g(3) = \frac{12}{3+1} = \frac{12}{4} = 3$; $Q(3,3)$. $\quad m_{sec} = \frac{3-6}{3-1} = \frac{-3}{2}$

~~**b**. Write an equation of the line between the points P and Q.~~

c. The table below lists the slope of the secant line passing through the point P and the point $Q(x, f(x))$ for several values of x.

x	0.9	0.99	0.999	1	1.001	1.01	1.1
g(x)	6.3157	6.0302	6.0030	6	5.9970	5.9701	5.7143
m_{sec}	-3.1579	-3.0151	-3.0015		-2.9985	-2.9851	-2.8571

$-3 \quad -3$

Use the information in the table to estimate the slope of the tangent line to $g(x)$ at the point $P(1,6)$.

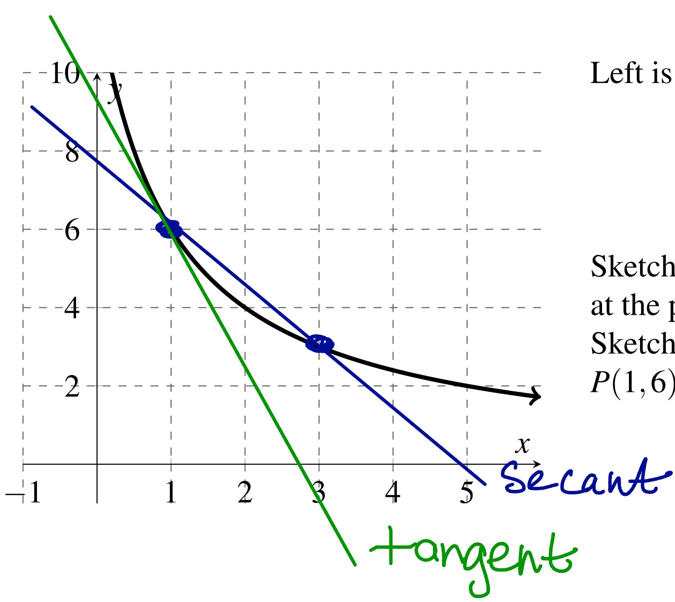
$m_{sec} \approx -3$

d. Use the slope from part (c) above to write an equation of the tangent line to $g(x)$ at point $P(1,6)$.

point $(1,6)$
slope $m = -3$

line: $y - 6 = -3(x-1)$ or
$y = 6 - 3(x-1)$ or
$y = 9 - 3x$

e.



Left is a sketch of the graph of

$$f(x) = \frac{12}{x+1}.$$

Sketch and label the **tangent** line to the graph at the point $P(1,6)$.
Sketch and label the **secant** line between $P(1,6)$ and $Q(3, g(3))$.