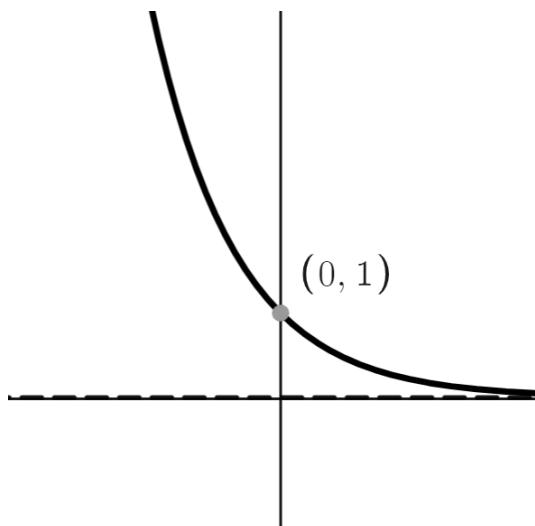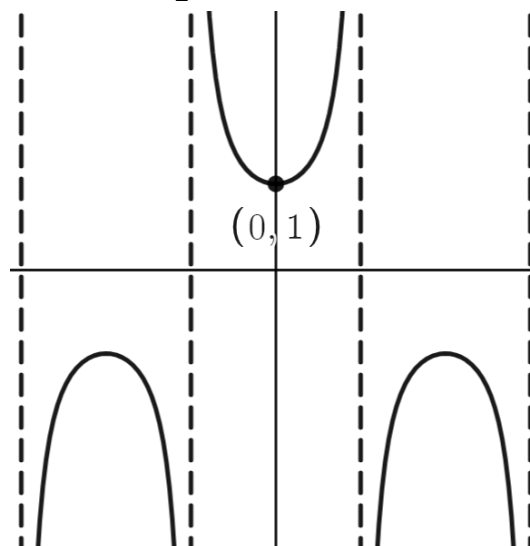# Math 221 Sec 003 Quiz 10

1. Graph each of the following functions, labeling the x and y-intercepts and all asymptotes.

a) $y = e^{-x}$
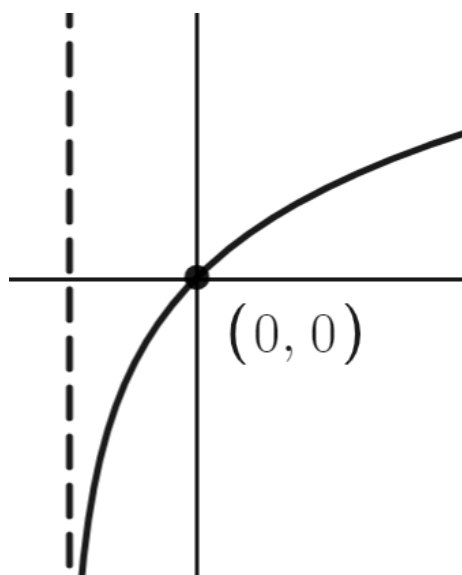

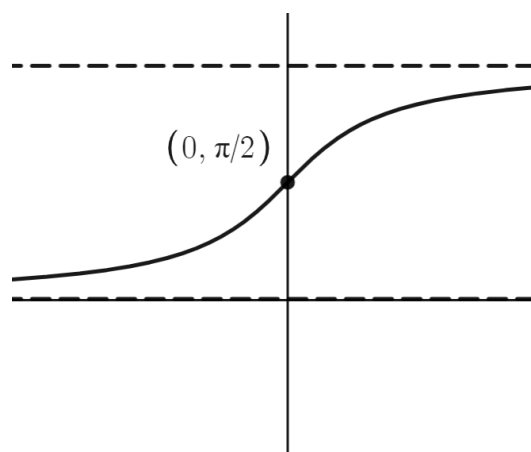asymptote: $y = 0$

c) $y = \sec\left(\dfrac{\pi}{2}x\right)$

$(0, 1)$

asymptote: $x = \pm 1, x = \pm 3, \cdots$

b) $y = \ln(x + 1)$

$(0, 0)$

asymptote: $x = -1$

d) $y = \arctan(x) + \dfrac{\pi}{2}$

$(0, \pi/2)$

asymptote: $y = 0, y = \pi$

1

2. Evaluate the following limit using L'Hopital's rule.
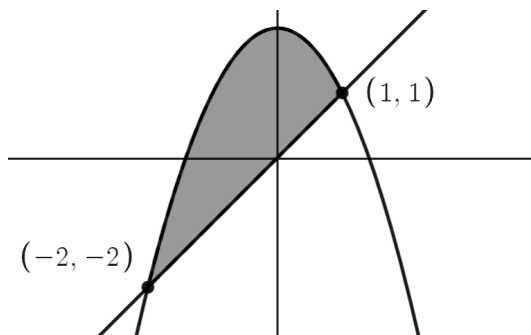
$$\lim_{x \to 0^+} \ln(e^x - 1) - \ln(2x).$$

(Do not evaluate the ln.)

Solution: Indeterminate form $\infty - \infty$

$$
\begin{aligned}
\lim_{x \to 0^+} \ln(e^x - 1) - \ln(2x) &= \lim_{x \to 0^+} \ln\left(\frac{e^x - 1}{2x}\right) && \text{(conversion +1)} \\
&= \ln\left(\lim_{x \to 0^+} \frac{e^x - 1}{2x}\right) \\
&= \ln\left(\lim_{x \to 0^+} \frac{e^x}{2}\right) && \text{(0/0, L'Hopital +1)} \\
&= \ln\left(\frac{1}{2}\right) \\
&= -\ln(2) && \text{(correct answer +1)}
\end{aligned}
$$

3. Find the area enclosed by the curves $y = 2 - x^2$ and $y = x$.

    Solution:

Set $2 - x^2 = x$, $x^2 + x - 2 = 0$.

$x = 1, x = -2$.

(correct bounds +1)

$$
\begin{aligned}
A &= \int_{-2}^{1} (2 - x^2) - (x) \, dx && \text{(correct setup+1)} \\
&= 2x - \frac{1}{3}x^3 - \frac{1}{2}x^2 \Big|_{-2}^{1} \\
&= \left(2 - \frac{1}{3} - \frac{1}{2}\right) - \left(-4 + \frac{8}{3} - 2\right) \\
&= \frac{9}{2} && \text{(correct answer +1)}
\end{aligned}
$$