# Champlain College – St.-Lambert

MATH 201-009: Functions and Trigonometry

## Review for Test # 3

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## Questions

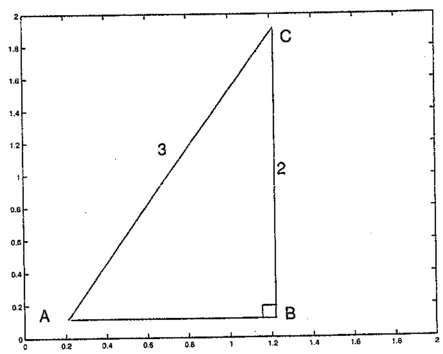
1. Sketch

$$(a)\ \ y = -2e^{2x+1}, \qquad\qquad (b)\ \ y = \frac{1}{2}\ln(\frac{1}{2}x - 1).$$

2. Solve:

$$(a)\ \ 4^x = 2^{x+2}, \qquad\qquad (b)\ \ 2\log_5 x - \log_5(x+1) = 1.$$

3. In the right triangle $\Delta ABC$ as shown below, find $\sin\angle A$, $\cos\angle A$, $\tan\angle A$, $\cot\angle A$, $\sec\angle A$ and $\csc\angle A$.




4. Convert the angle from D$^0$M′S″ into radian: $\theta = 32^0 7' 25''$.

5. Sketch the graph of the following function:

$$(a)\ \ y = -2\sin(3x + \frac{\pi}{2}), \qquad\qquad (b)\ \ y = -\cos(\frac{1}{2}x - \frac{\pi}{4}).$$

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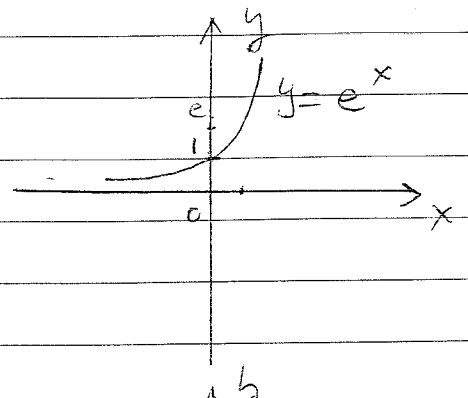
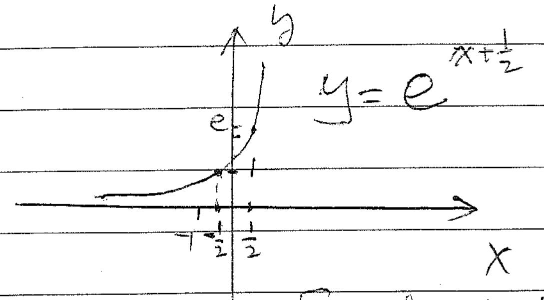
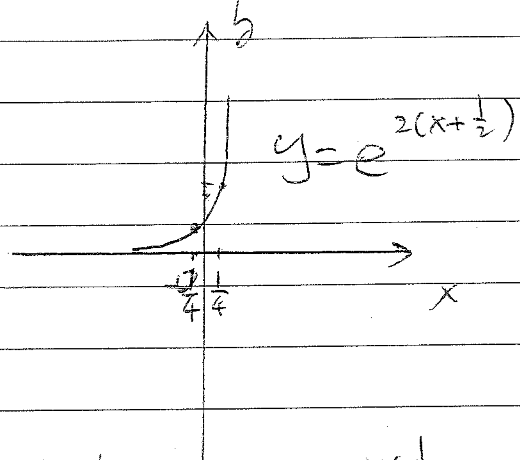
# Solutions to Review Questions for Test #3

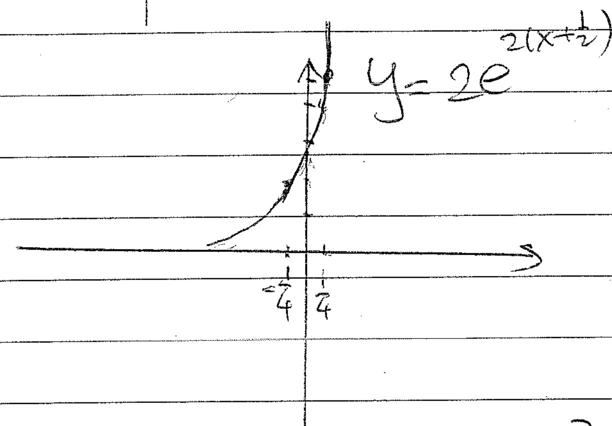
Q1.(a). $y = -2e^{2x+1} = -2e^{2(x+\frac{1}{2})}$



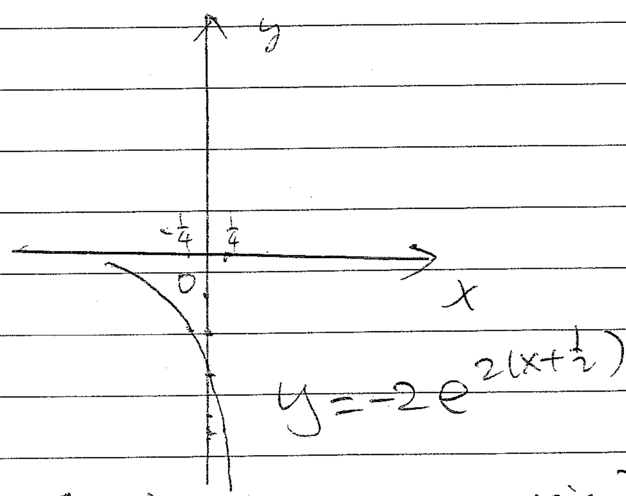




[shift $\frac{1}{2}$ to the left]




[shrink $y = e^{x+\frac{1}{2}}$ in x-direction] [stretch in y]

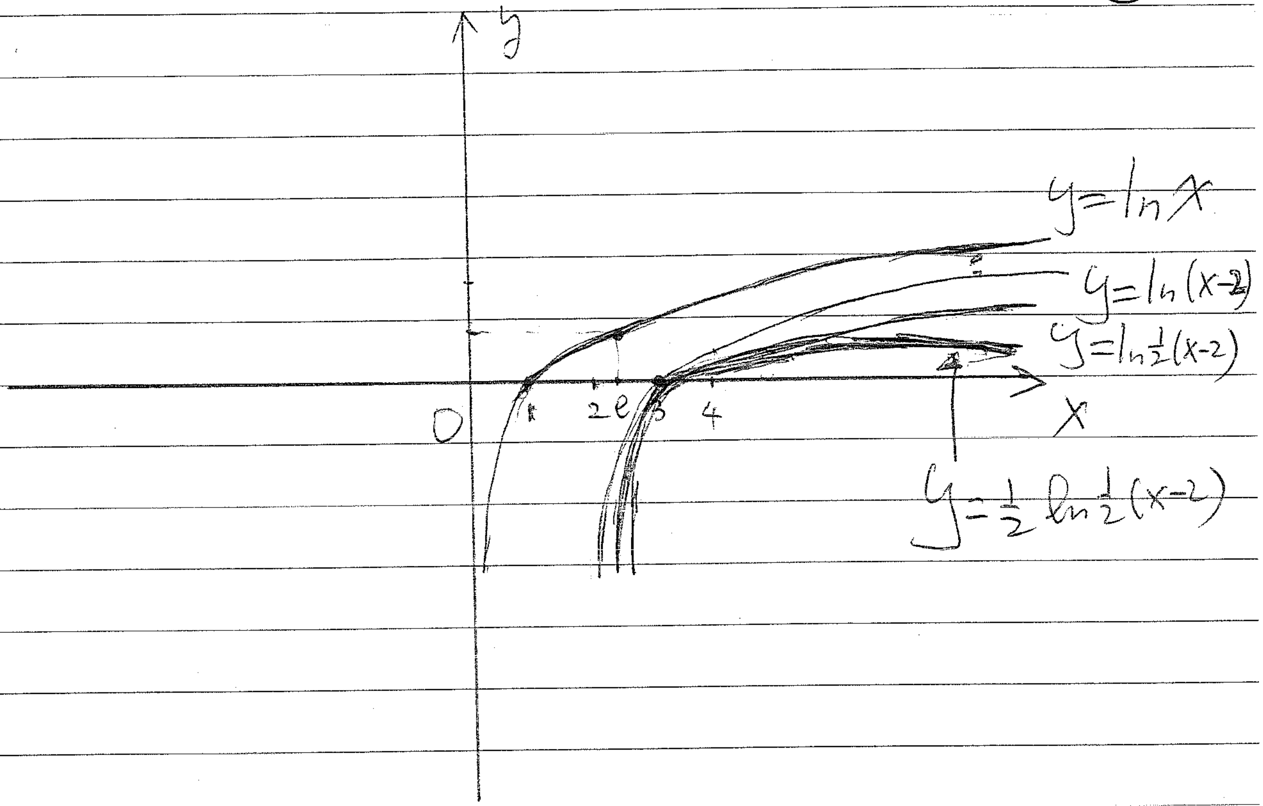



[reflect on x-axis]

$y = \frac{1}{2}\ln(\frac{1}{2}x - 1) = \frac{1}{2}\ln\frac{1}{2}(x-2)$



Q1.(b)




Q2.(a) $4^x = 2^{x+2}$

$(2^2)^x = 2^{x+2}$

$2^{2x} = 2^{x+2}$

$2x = x + 2$

$\boxed{x = 2}$

Q2.(b) Note: $2\log_5 x = \log_5 x^2$

$\log_5 5 = 1$

then the equation is reduced to

$\log_5 x^2 - \log_5 (x+1) = \log_5 5$

i.e. $\cancel{\log_5} \frac{x^2}{x+1} = \cancel{\log_5} 5$

$$\frac{x^2}{x+1} = 5$$

$$x^2 = 5(x+1)$$

$$x^2 - 5x - 5 = 0$$

By Quadratic formula, the solutions are.

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{5 \pm \sqrt{5^2 - 4\cdot(-5)}}{2}$$

$$= \frac{5 \pm \sqrt{5}}{2}$$

i.e. $\boxed{x_1 = \frac{5+\sqrt{5}}{2}}$, $\boxed{x_2 = \frac{5-\sqrt{5}}{2}}$

From the domain of the equation, i.e,

$x > 0$ and $x+1 > 0$

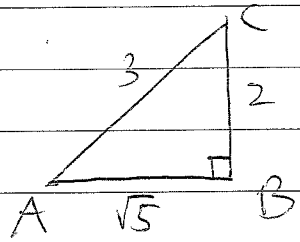
$\Rightarrow \boxed{x > 0}$

We can check:

$$x_1 = \frac{5+\sqrt{5}}{2} > 0, \quad x_2 = \frac{5-\sqrt{5}}{2} > 0$$

So, both $x_1$ and $x_2$ are solutions.

Q3.




$$AB = \sqrt{AC^2 - BC^2}$$
$$= \sqrt{3^2 - 2^2}$$
$$= \sqrt{9-4} = \sqrt{5}$$

$$\sin \angle A = \frac{opp}{hyp} = \frac{BC}{AC} = \frac{2}{3}$$

$$\cos \angle A = \frac{adj}{hyp} = \frac{AB}{AC} = \frac{\sqrt{5}}{3}$$

$$\tan \angle A = \frac{opp}{adj} = \frac{BC}{AB} = \frac{2}{\sqrt{5}}$$

$$\cot \angle A = \frac{adj}{opp} = \frac{AB}{BC} = \frac{\sqrt{5}}{2}$$

$$\sec \angle A = \frac{1}{\cos \angle A} = \frac{3}{\sqrt{5}}$$

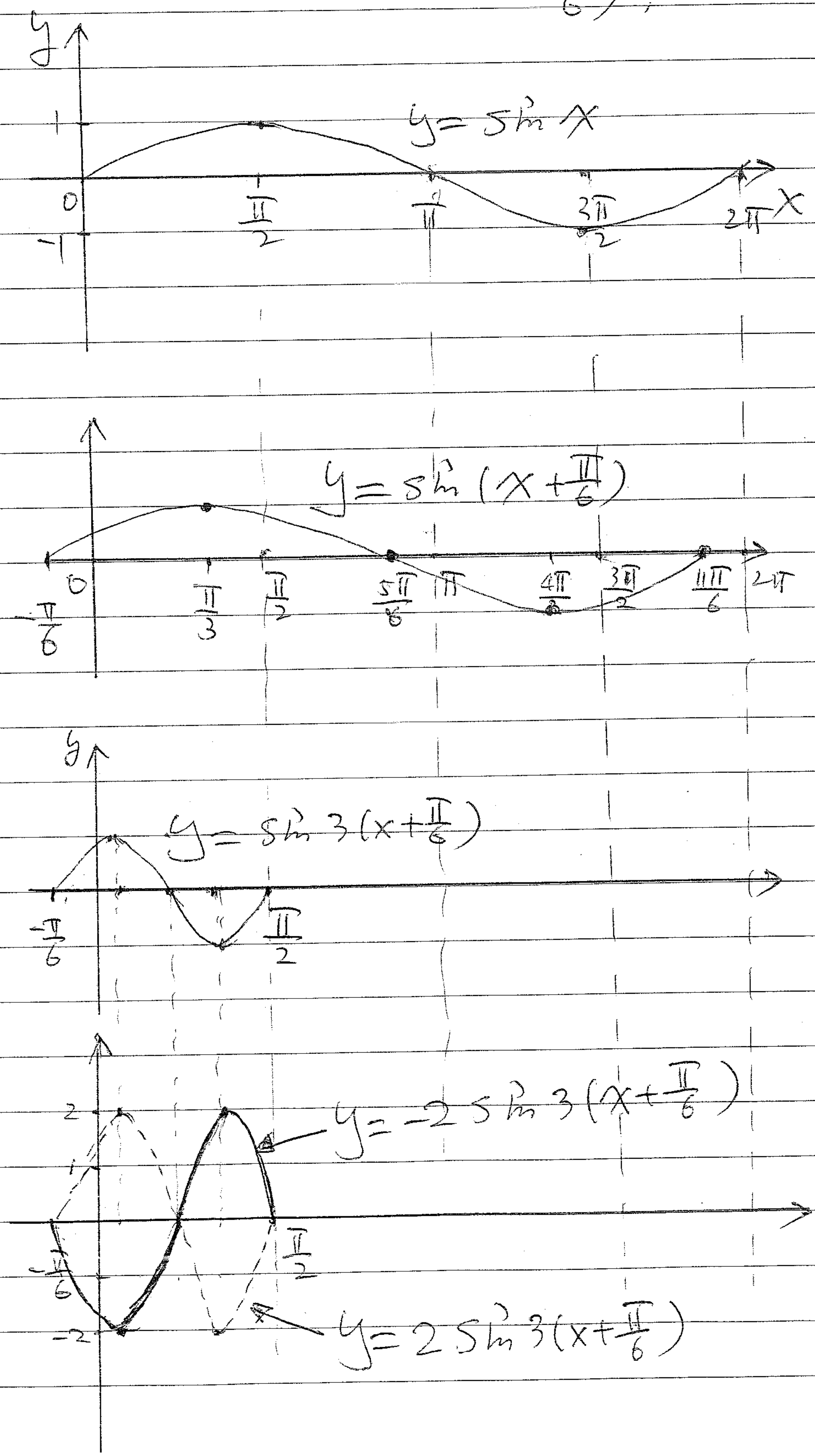
$$\csc \angle A = \frac{1}{\sin \angle A} = \frac{3}{2}$$

Q4.

$$\theta = 32^\circ 7' 25''$$
$$= 32^\circ + 7' + 25''$$
$$= 32^\circ + 7' + \left(\frac{25}{60}\right)'$$
$$\approx 32^\circ + 7.416'$$
$$\approx 32^\circ + \left(\frac{7.416}{60}\right)^\circ$$
$$\approx 32.1236^\circ$$
$$\approx \frac{32.1236^\circ}{180^\circ} \times \pi \approx \boxed{0.17847\,\pi}$$

Q5 (a) $y = -2\sin\left(3x + \frac{\pi}{2}\right)$

$= -2\sin 3\left(x + \frac{\pi}{6}\right)$, period $= \frac{2\pi}{3}$



Q5 (b) $y = -\cos\left(\frac{1}{2}x - \frac{\pi}{4}\right)$

$= -\cos\frac{1}{2}\left(x - \frac{\pi}{2}\right)$, Period $= \frac{2\pi}{\frac{1}{2}}$

$= 4\pi$