3:02

Quiz 5C, Precalculus-02 (Calculator needed) 3:09

Dr. Graham-Squire, Fall 2013

7 min

⇒ 25 min.

Name: Key

1. (3 points) For what value(s) of x does the equation hold?

$$\ln(x+8) = \ln x + \ln 8$$

$e^{\ln(x+8)} = e^{\ln 8x}$

$x + 8 = 8x$

$8 = 7x$

$\frac{8}{7} = x$

2. (2 points) Draw a unit circle to help show your work: Find the exact value of

(a) $\sin(\frac{3\pi}{4})$ $t = \frac{3\pi}{4}$, $\overline{t} = \frac{\pi}{4} \Rightarrow (\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}) = \sin(\frac{3\pi}{2}) = \frac{\sqrt{2}}{2}$

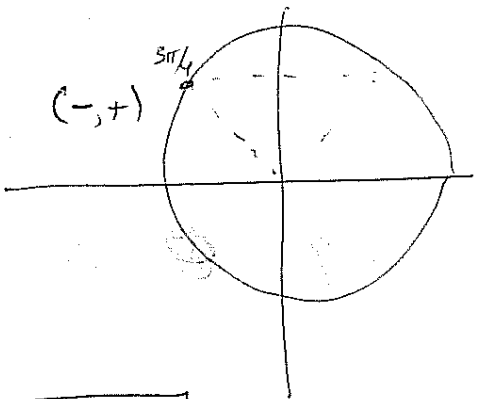
(b) $\tan(\frac{-4\pi}{3})$

$t = \frac{-4\pi}{3} + 2\pi = \frac{2\pi}{3}$

$\overline{t} = \frac{\pi}{3} \Rightarrow (\frac{1}{2}, \frac{\sqrt{3}}{2})$

$t \Rightarrow (\frac{-1}{2}, \frac{\sqrt{3}}{2})$

$\Rightarrow \tan(\frac{-4\pi}{3}) = \frac{\frac{\sqrt{3}}{2}}{(-\frac{1}{2})} = \frac{\sqrt{3}}{2} \cdot \frac{-2}{1} = \boxed{-\sqrt{3}}$

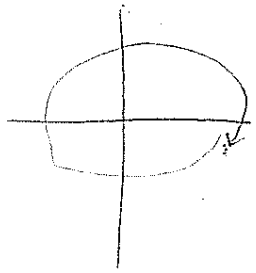


3. (1 point) Find the reference number and terminal point for $t = \frac{-13\pi}{6}$. Show your work and explain how you got your results.

$\frac{-13\pi}{6} + 2\pi = \frac{-13\pi}{6} + \frac{12\pi}{6} = \frac{-\pi}{6} + 2\pi = \frac{11\pi}{6}$

$\bar{t} = \frac{\pi}{6} \Rightarrow \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

$\Rightarrow t = \frac{-13\pi}{6} \Rightarrow \left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$



4. (4 points) A bacteria culture is started and after 4 hours has 1000 bacteria. It is known that this bacteria doubles in population every 5 hours. What will the population be in 8 more hours?

$\Rightarrow t = 12$

$A = Pe^{rt} \qquad 1000 = Pe^{r\cdot 4}$

doubles every 5 hours $\Rightarrow \quad 2P = Pe^{r5} \Rightarrow \ln 2 = \ln e^{5r}$

$\frac{\ln 2}{5} = r$

$\Rightarrow 1000 = Pe^{\left(\frac{\ln 2}{5}\right)\cdot 4}$

$P = \frac{1000}{e^{\left(\frac{\ln 2}{5}\right)\cdot 4}} = 574.35$

$\Rightarrow A(t) = 574e^{\left(\frac{\ln 2}{5}\right)t}$

$A(12) = 574e^{\left(\frac{\ln 2}{5}\right)\cdot 12} = 3029.59$

$\approx \boxed{3030}$

Quiz 5D, Precalculus-02, (Calculator needed)

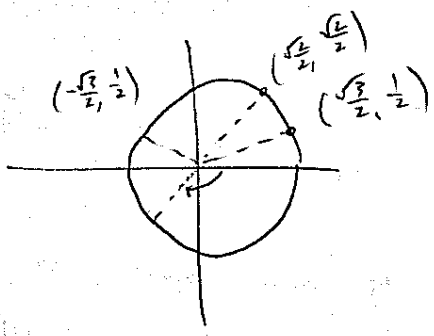
Dr. Graham-Squire, Fall 2013

Name: Key

1. (2 points) Draw a unit circle to help show your work: Find the exact value of

   (a) $\sin(\frac{5\pi}{6}) = \frac{1}{2}$

   (b) $\tan(\frac{-3\pi}{4}) = \frac{(-\frac{\sqrt{2}}{2})}{(-\frac{\sqrt{2}}{2})} = 1$



2. (3 points) For what value(s) of x does the equation hold:

$$\ln(x+5) = \ln x + \ln 5$$

$$\Rightarrow e^{\ln(x+5)} = e^{\ln 5x}$$

$$x+5 = 5x$$

$$-x \qquad -x$$

$$\frac{5}{4} = \frac{4x}{4}$$

$$\boxed{\frac{5}{4} = x}$$

$A = Pe^{rt}$

3. (4 points) A bacteria culture is started and after 7 hours has 1000 bacteria. It is known that this bacteria doubles in population every 3 hours. What will the population be in 4 more hours?

- doubles every 3 hours $\Rightarrow \quad \frac{2P}{P} = \frac{Pe^{r3}}{P} \Rightarrow 2 = e^{3r} \Rightarrow \frac{\ln 2}{3} = r$

- after 7 hours has 1000 bacteria $\Rightarrow \quad 1000 = Pe^{(\frac{\ln 2}{3})\cdot 7}$

$$\Rightarrow P = \frac{1000}{e^{(\frac{\ln 2}{3})\cdot 7}} \approx 198$$

$$\Rightarrow A(t) = 198\, e^{(\frac{\ln 2}{3})t}$$

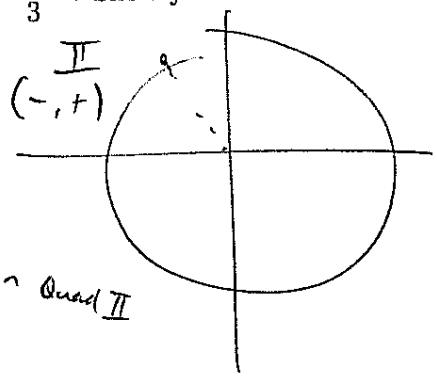
in 4 more hours $\Rightarrow t = 11$

$$A(11) = 198e^{(\frac{\ln 2}{3})11} = \boxed{2514}$$

4. (1 point) Find the reference number and terminal point for $t = \frac{-10\pi}{3}$. Show your work and explain how you got your results.

$$t = \frac{-10\pi}{3} + 2\pi = \frac{-10\pi}{3} + \frac{6\pi}{3} = \frac{-4\pi}{3} + 2\pi$$

$$= \frac{-4\pi}{3} + \frac{6\pi}{3} = \frac{2\pi}{3} \Rightarrow \text{in Quad II}$$



$$\Rightarrow \boxed{\bar{t} = \pi - \frac{2\pi}{3} = \frac{\pi}{3}} \rightarrow \left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$$

$\Rightarrow$ terminal point for $\frac{2\pi}{3}$ (and $t = \frac{-10\pi}{3}$) is $\boxed{\left(\frac{-1}{2}, \frac{\sqrt{3}}{2}\right)}$