MTH 130 Precalculus, Classwork 11 **Fall 2014**

(1) Solve

(a) $\dfrac{5}{1-e^{-x}} = 2.$

(b) $e^x + 12e^{-x} = 1$

1.a) $5 = 2(1-e^{-x}) = 2-2e^{-x}$

$3 = -2e^{-x}$ $e^{-x} = -3/2$, no solutions.

1.b) $e^x - 1 + 12e^{-x} = 0$ $(e^x)^2 - e^x + 12 = 0$.

$(e^x - 4)(e^x + 3) = 0$

$e^x = 4$ $e^x = -3$

$\Rightarrow x = \ln(4)$ no solution.

(2) Find the inverse function for

(a) $f(x) = 5^{x-2}$ 2.a) $y = 5^{x-2}$

$\log_5 y = x - 2$

$\log_5 y + 2 = x$

$f^{-1}(x) = \log_5(x) + 2$.

(b) $f(x) = 3\ln(x+2)$ 2.b) $y = 3\ln(x+2)$

$\frac{y}{3} = \ln(x+2)$

$e^{y/3} = x+2$

$x = e^{y/3} - 2$

$f^{-1}(x) = e^{x/3} - 2$.

(3) Find the point on the unit circle:

3.a) $x^2 + \left(-\frac{1}{4}\right)^2 = 1$

$x^2 = 1 - \frac{1}{16}$.

$x = \pm\frac{\sqrt{15}}{4}$.

(a) whose x-coordinate is negative and whose y-coordinate is $-\frac{1}{4}$.

$x = -\frac{\sqrt{15}}{4}$

$\left(-\frac{\sqrt{15}}{4}, -\frac{1}{4}\right)$.

(b) whose y-coordinate is positive, and whose x-coordinate is $-\frac{2}{3}$.

3.b) $\left(-\frac{2}{3}\right)^2 + y^2 = 1$

$y^2 = 1 - \frac{4}{9}$

$y = \pm\frac{\sqrt{5}}{3}$.

$\left(-\frac{2}{3}, \frac{\sqrt{5}}{3}\right)$.

(c) corresponding to the terminal point for $t = 20\pi$.

3.c) $(1, 0)$

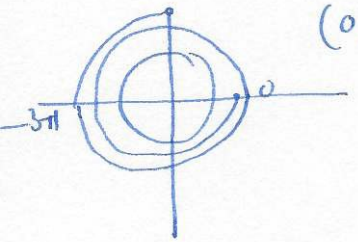
(d) corresponding to the terminal point for $t = -19\pi$.

3.d) $(-1, 0)$

(e) corresponding to the terminal point for $t = -7\pi/2$.

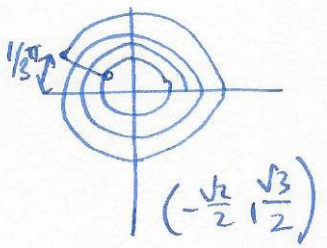
3.e) $-\frac{7}{2}\pi = \left(-3 - \frac{\pi}{2}\right)\pi$

$(0, 1)$



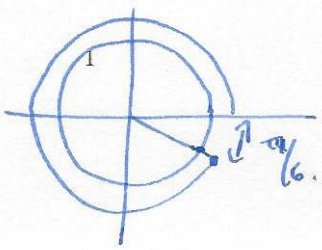
(f) corresponding to the terminal point for $t = 14\pi/3$.

3.f) $\frac{14}{3}\pi = \left(4 + \frac{2}{3}\right)\pi$

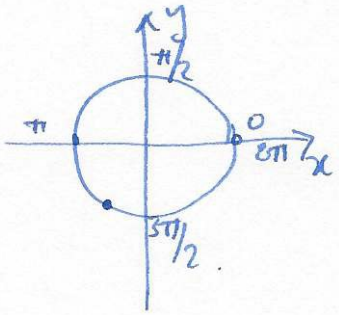


(g) corresponding to the terminal point for $t = 11\pi/6$.

3.g) $\frac{11}{6}\pi = \left(1 + \frac{5}{6}\right)\pi$.



$\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$.



(4) Find the reference number $\bar{t}$ for:

(a) $t = \pi/2$

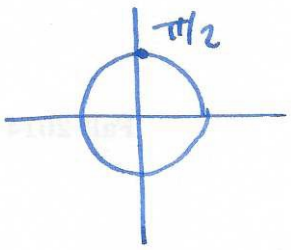
(b) $t = 17\pi/4$

(c) $t = -2\pi/7$

(d) $t = -8\pi/3$

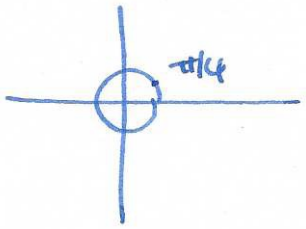
t	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
x	$\sqrt{4}/2$	$\sqrt{3}/2$	$\sqrt{2}/2$	$\sqrt{1}/2$	$\sqrt{0}/2$
y	$\sqrt{0}/2$	$\sqrt{1}/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	$\sqrt{4}/2$

Q4 a)



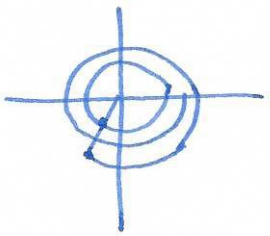
$\bar{t} = \frac{\pi}{2}$.

b)



$\frac{17\pi}{4} = \left(4 + \frac{1}{4}\right)\pi$ $\quad \bar{t} = \frac{\pi}{4}$.

c) $\bar{t} = -\frac{2}{7}\pi$

d) $-\frac{8}{3}\pi = \left(-2 - \frac{2}{3}\right)\pi$

$\bar{t} = \frac{1}{3}\pi$.