MATH 113 – Fall 2004 – Prof. SACHS

HOMEWORK 1 COMMENTS

pp. 8–9 **#20** $\frac{\text{change in } y}{\text{change in } x} = \frac{-3}{2}$ so $y = -\frac{3}{2}x + b$; $b = 2$

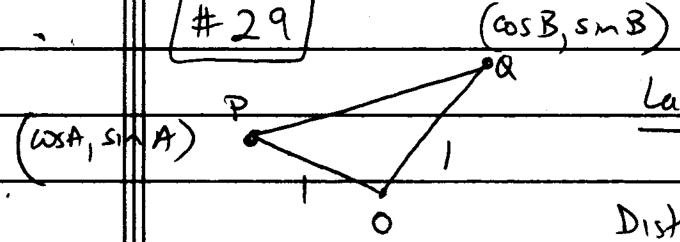
#34 slope $= +1$, point $(1,0)$ $\Rightarrow$ $y - 0 = 1\cdot(x-1)$ or $y = x - 1$.

#36 (a) $(-1,4)$ (b) $(3,-2)$ (c) $(+5,2)$ (d) $(0,x)$ (e) $(-y,0)$ f) $(-y,x)$

pp. 55–57 **#4** At $-3\pi/2$ get $x=0, y=1 \Rightarrow \sin(-\frac{3\pi}{2}) = 1$, $\cos(-\frac{3\pi}{2}) = 0$, $\tan(-\frac{3\pi}{2})$ = UND

At $-\pi/3$ (Quad IV), $\underset{\cos(-\pi/3)}{x = \frac{1}{2}}$, $\underset{\sin(-\pi/3)}{y = \frac{\sqrt{3}}{2}}$, $\tan(-\pi/3) = -\sqrt{3}$, etc.

#29



Law of cosines: $c^2 = a^2 + b^2 - 2ab\cos C$

$= 1 + 1 - 2\cos C$

Distance $c^2 = (\cos B - \cos A)^2 + (\sin B - \sin A)^2$

$= \cos^2 B - 2\cos A\cos B + \cos^2 A$

$+ \sin^2 B - 2\sin A\sin B + \sin^2 A$

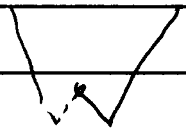
$= 1 + 1 - 2\left[\cos A\cos B + \sin A\sin B\right]$

COMBINE / CANCEL $\leftarrow$

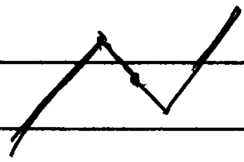
$\cos(A - B)$

$= \cos A\cos B + \sin A\sin B$

pp. 80–81 **#2**

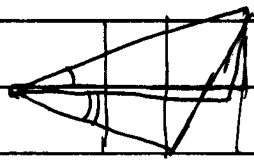


– EVEN



– ODD

#9



angles add → one is $\tan^{-1}\frac{1}{2}$ $\measuredangle CAB$

other is $\tan^{-1}\frac{1}{3}$ $\measuredangle CAD$

From picture, angle $\measuredangle ABC$ is right angle (slope $-\frac{1}{2}$, $+2$ give $\perp$) and $\overline{AB} = \overline{BD}$ so angle is $\pi/4$.

$\boxed{\#22}$ If f is 1:1 and $f(x) \neq 0$ show $g(x)$ is also.

Suppose $g(a) = g(b)$ — this says $\frac{1}{f(a)} = \frac{1}{f(b)}$

which says $f(a) = f(b)$. But f is 1 to 1 so $a = b$.

$\boxed{\#24}$ (a) If $f(x_1) = f(x_2)$ then $\frac{ax_1+b}{cx_1+d} = \frac{ax_2+b}{cx_2+d}$

which is equivalent to $(ax_1+b)(cx_2+d) = (ax_2+b)(cx_1+d)$

Multiply out: $acx_1x_2 + bcx_2 + adx_1 + bd = acx_1x_2 + bcx_1 + adx_2 + bd$

Cancel like terms, subtract $adx_2 + bcx_1$ to get

$0 = adx_1 - adx_2 - bcx_1 + bcx_2 = (ad-bc)(x_1-x_2) \Rightarrow$

$x_1 - x_2 = 0$ if $ad - bc \neq 0$.

(b) If $\frac{ax+b}{cx+d} = y$ then $ax+b = cyx + dy$ solve for x

$(a-cy)x = -b+dy$

$x = \frac{-b+dy}{a-cy}$

(c) Horizontal asymptote $y = a/c$

Vertical asymptote $x = -d/c$

(d) For inverse, horizontal/vertical are reversed