

$$\log_5 \left(\frac{1}{125} \right) = -3$$

② a) $\log 25 + \log x = \log 125$
 $\log (25x) = \log 125$
 $25x = 125$
 $x = 5$

b) $\log (x(2x-5)) = \log (12)$
 $\log (2x^2 - 5x) = \log (12)$
 $2x^2 - 5x = 12$
 $2x^2 - 5x - 12 = 0$

$$(2x+3)(x-4) = 0$$

$$x = -3/2, 4$$

but $\log(-3/2)$ is impossible, so $x = 4$

	-24	
	-8	3
		-5
2x		3
x	2x ²	3x
-4	-8x	-12

③ a) $x^2 (3x^3 y^6)$
 $= 27x^5 y^6$

b) $\frac{81x^8}{27x} = 3x^7$

④ a) $\log (9 \cdot 10 / 5) = \log 18$

b) $\log_5 (250 \cdot 2^2) = \log_5 (1000)$

⑤ $y = \frac{1}{2} \sqrt{2x+1}$ ← range: $y \geq 0$

$$x = \frac{1}{2} \sqrt{2y+1}$$

$$2x = \sqrt{2y+1}$$

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

$$(2x)^2 - 1 = 2y$$

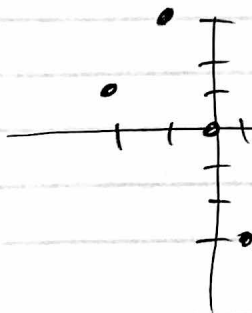
$$\frac{(2x)^2 - 1}{2} = y$$

$$f^{-1}(x) = \frac{(2x)^2 - 1}{2}, x \geq 0$$

same as $\frac{4x^2 - 1}{2}$, so (B)

⑥

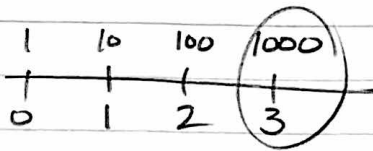
$(-1, 2) \rightarrow (2, -1)$
 $(0, 10) \rightarrow (0, 0)$
 $(-3, 1) \rightarrow (1, -3)$
 $(3, -1) \rightarrow (-1, 3)$
 $(1, -2) \rightarrow (-2, 1)$



Switch x and y for each coordinate.

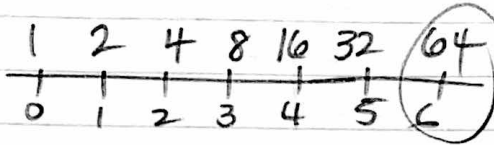
7 a) $\log 1000$

$= 3$



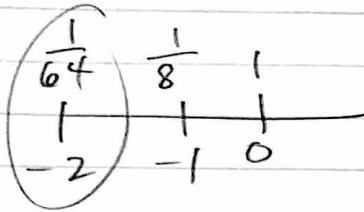
b) $\log_2 64$

$= 6$



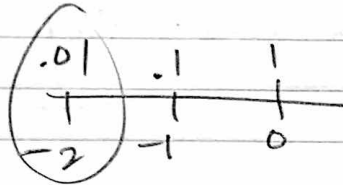
c) $\log_8 (\frac{1}{64})$

$= -2$



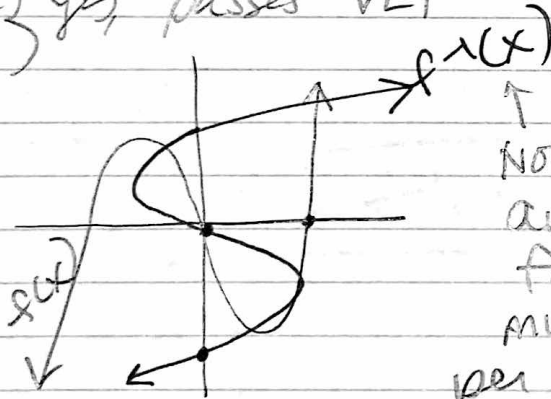
d) $\log 0.01$

$= -2$



8 get original function

9 a) $y = \frac{1}{2}$ passes VLT
b)



Not a function, there are 3 outputs for $x=0$, for example, function must have only 1 output per x -value.

10 $3c + 2r = 60$

$1c + 5r = 52.5 \Rightarrow c = 52.5 - 5r$

$3(52.5 - 5r) + 2r = 60$

$157.5 - 15r + 2r = 60$

$-13r = -97.5$

$r = 7.5$

$c = 52.5 - 5(7.5)$

$c = 15$

CDS are \$15 and records are \$7.50

11) a) $y = 4(x+3)^2 - 8$
 $x = 4(y+3)^2 - 8$

$$\pm \sqrt{\frac{x+8}{4}} = y+3$$

$$y = -3 \pm \sqrt{\frac{x+8}{4}} = \boxed{-3 \pm \frac{\sqrt{x+8}}{2} = f^{-1}(x)}$$

b) $y = \frac{20}{x-3}$

$$x = \frac{20}{y-3}$$

$$\frac{1}{x} = \frac{y-3}{20}$$

$$\frac{20}{x} = y-3$$

$$\frac{20}{x} + 3 = y$$

$$\boxed{f^{-1}(x) = \frac{20}{x} + 3}$$

12) $rt = b \quad \log_c(e) = 4$

13) $y = 3x - 5$

$$x = 3y - 5$$

$$x + 5 = 3y$$

$$y = \boxed{\frac{x+5}{3} = f^{-1}(x)}$$

14) $3x = 5 - 7x^2$

$$7x^2 + 3x - 5 = 0$$

$$x = \frac{-3 \pm \sqrt{9 - 4(7)(-5)}}{2(7)} = \frac{-3 \pm \sqrt{9 + 140}}{14} = \frac{-3 \pm \sqrt{149}}{14}$$

15) $5x - 2y = -36$

$$4x + 3y = -15$$

$$20x - 8y = -144$$

$$20x + 15y = -75$$

$$-23y = -69$$

$$y = 3$$

$$5x - 2(3) = -36$$

$$5x = -30$$

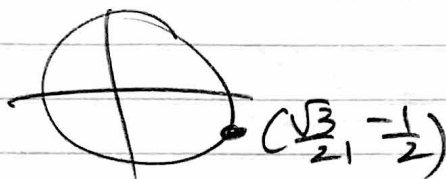
$$x = -6$$

$$\boxed{(-6, 3)}$$

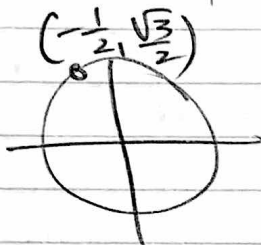
16) a) $\sin\left(\frac{7\pi}{4}\right)$
 $= -\frac{\sqrt{2}}{2}$



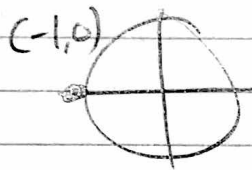
b) $\cos(-\pi/6) =$
 $= \frac{\sqrt{3}}{2}$



c) $\cos\left(\frac{2\pi}{3}\right)$
 $= -\frac{1}{2}$

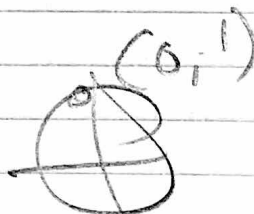


d) $\sin(\pi)$
 $= 0$

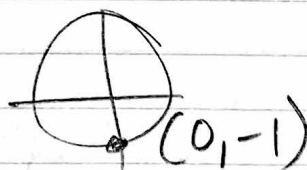


e) $\cos(\pi) = -1$

f) $\sin\left(\frac{\pi}{2}\right) = 1$

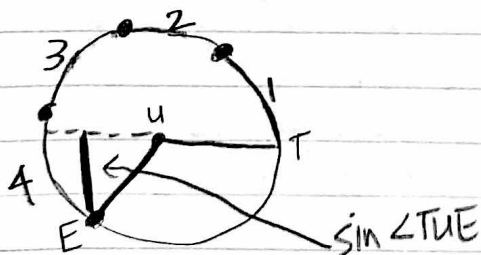


g) $\sin\left(\frac{3\pi}{2}\right) = -1$



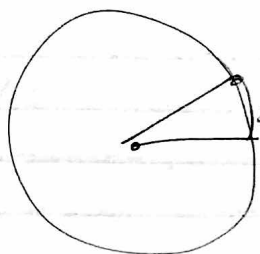
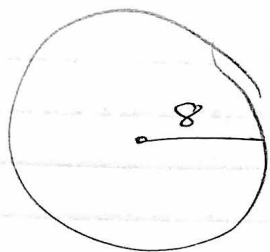
h) $\cos\left(\frac{3\pi}{2}\right) = 0$

17)



$$4 \text{ rad} \times \frac{180^\circ}{\pi \text{ rad}} = \boxed{229.2^\circ}$$

18)



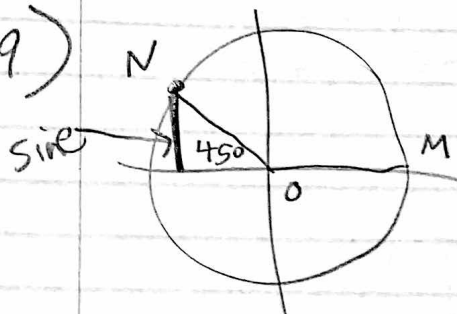
a)

$$\frac{\pi}{6} \text{ radians} \times \frac{8 \text{ cm}}{\text{radian}} = 4.19 \text{ cm}$$

b)

$$\frac{3\pi}{4} \text{ radians} \times \frac{8 \text{ cm}}{\text{radian}} = 18.8 \text{ cm}$$

19)



a) 45°

b) vertical length shown

c) $\angle MON = 3\pi/4$
reference angle is $\pi/4$.

20)

a) $\frac{4\pi}{3} = 4(60) = 240^\circ$

b) $3\pi = 3(180) = 540^\circ$

c) $\frac{7\pi}{4} = 7(45) = 315^\circ$

d) $\frac{5\pi}{6} = 5(30) = 150^\circ$

21)

0	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	270°
0	π/6	π/4	π/3	π/2	2π/3	3π/4	5π/6	π	7π/6	5π/4	3π/2

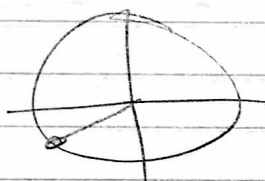
300°	360°	495°	1040°	-3600°	36°	20°	55°	≈57.3°	1°	≈344°	21°
4π/3	2π	11π/4	6π	-10π	π/5	π/9	11π/36	1	π/100	6	7π/60

Can convert $\pi = 180^\circ$

22) should be $8x - 24 - 2x - 6 = 5x - 5$
 $6x - 30 = 5x - 5$
 $x = 25$

23) $\frac{x-3}{x+8} = \frac{-2}{3}$
 $x-3 = \frac{-2(x+8)}{3}$
 $3x-9 = -2x-16$
 $5x = -7$
 $x = -7/5$

24) $-\frac{1}{2}$



25)

	$\pi/6$	$\pi/4$	$\pi/3$
$\sin \theta$	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$
$\cos \theta$	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$
$\tan \theta$	$1/\sqrt{3}$	1	$\sqrt{3}$

26) Dropped a solution $3x = 6$
 $x = 0$

and factored wrong
 $(x^2 + 2x - 15) = (x+5)(x-3)$

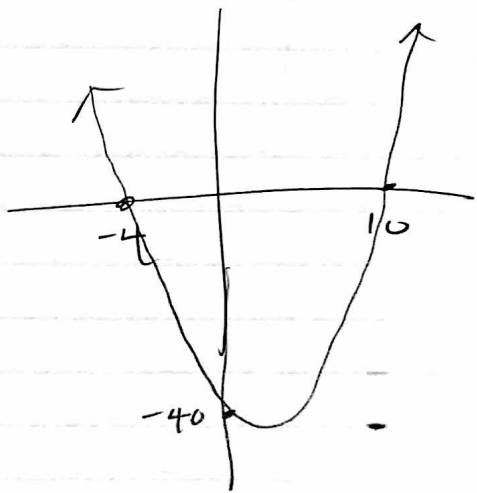
So $x = 0, -5, 3$

27)

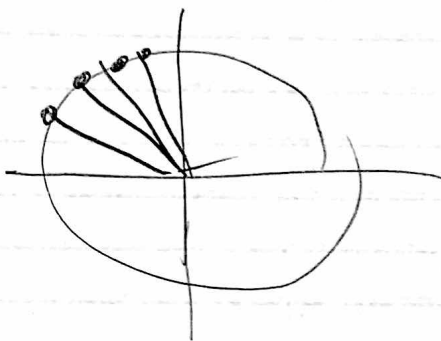
x intercepts: set $y=0$, factor, and solve for x
y intercept: plug in 0 for x and solve for y .

$$\begin{aligned}x: \quad x^2 - 6x - 40 &= 0 \\(x - 10)(x + 4) &= 0 \\x &= 10, -4\end{aligned}$$

$$\begin{aligned}y: \quad y &= 0^2 - 6(0) - 40 \\y &= -40\end{aligned}$$



28)



all in Q3

29)

$$\begin{aligned}2S + 3C &= 10.3 \\4S + 2C &= 14.2\end{aligned}$$

$$\begin{aligned}4S + 6C &= 20.6 \\4S + 2C &= 14.2 \\4C &= 6.4 \\C &= 1.6\end{aligned}$$

$$\begin{aligned}2S + 3(1.6) &= 10.3 \\2S &= 5.5 \\S &= 2.75\end{aligned}$$

soup is \$2.75,
chips are \$1.60

30) cosine is x-coordinate, so $-\frac{\sqrt{3}}{2}$
sine is y-coordinate, so $-\frac{1}{2}$
angle is $\frac{7\pi}{6}$ or 210° .

31) a) $\tan 34^\circ = \frac{x}{20}$

$$x = 20 \tan 34^\circ \approx 13.5$$

b) $\tan 52^\circ = \frac{15}{y}$

$$y \cdot \tan 52^\circ = 15$$

$$y = \frac{15}{\tan 52^\circ} \approx 11.7$$

c) $\tan 35^\circ = \frac{7}{x}$

$$x = \frac{7}{\tan 35^\circ} \approx 10.0$$

d) $\tan 25^\circ = \frac{y}{26}$

$$y = 26 \tan 25^\circ = 12.1$$

e) $\tan 32^\circ = \frac{x}{10}$

$$x = 10 \tan 32^\circ \approx 6.25$$

f) $\tan 65^\circ = \frac{18}{y}$

$$y = \frac{18}{\tan 65^\circ} = 8.39$$