① $\frac{1}{z} = \frac{1}{3} + \frac{1}{5} \rightarrow \frac{1}{z} = \frac{8}{15} \rightarrow 8z = 15$ $\boxed{z = \frac{15}{8}}$

② $4(x^2 - 9)$

$\boxed{4(x+3)(x-3)}$

③ Must be a perfect square trinomial:

$a^2 + 2ab + b^2 = 0$

$b^2 = k$

$a = 2x \quad b = \sqrt{k} \rightarrow 2ab = 2(2x)\sqrt{k} \rightarrow 4x\sqrt{k} = 4x$

$\sqrt{k} = 1 \rightarrow \boxed{k = 1}$

④ $x = -\frac{3}{2} \rightarrow 2x = -3 \rightarrow 2x + 3 = 0$

$x = \frac{4}{5} \rightarrow 5x = 4 \rightarrow 5x - 4 = 0$

$y = (2x+3)(5x-4)$

$\boxed{y = 10x^2 + 7x - 12}$

⑤ $\frac{1}{3} x^{-2-(-4)} y^{-6-(3)} = \boxed{\frac{1}{3} x^2 y^{-9} \text{ or } \frac{x^2}{3y^9}}$

⑥ $(\sqrt{3x} + \sqrt{5y})(\sqrt{3x} + \sqrt{5y}) = 3x + \sqrt{15xy} + \sqrt{15xy} + 5y$

$= \boxed{3x + 5y + 2\sqrt{15xy}}$

⑦ $\left(x^{\frac{1}{2} + \frac{3}{2}}\right)^{\frac{1}{7}} = \left(x^2\right)^{\frac{1}{7}} = \boxed{x^{2/7}}$

⑧ $y = \left(\frac{1}{2}\right)^{-2} = \left(2\right)^2 = \boxed{4}$

⑨ $\boxed{10^4 = 10{,}000}$

⑩ $b^4 = 81$ ($81 = 3^4$)

$\boxed{b = 3}$ (cannot be -3)

(11) $\log_2[\sqrt[3]{x} * y] = \log_2 \sqrt[3]{x} + \log_2 y = \log_2 x^{1/3} + \log_2 y$

$= \frac{1}{3}\log_2 x + \log_2 y$

(12) slope: $\frac{5-3}{1-4} = \frac{2}{-3}$

pt.-slope $y-5 = -\frac{2}{3}(x-1)$ or $y-3 = -\frac{2}{3}(x-4)$

slope-intercept: $y = -\frac{2}{3}x + b$

$5 = -\frac{2}{3} + b \quad b = \frac{17}{3}$

$y = -\frac{2}{3}x + \frac{17}{3}$

(13) $\log 6 + \log 5 - \log 3 = \log 30 - \log 3 = \log 10$

(14) $(\csc^2\theta - 1)\tan^2\theta = \cot^2\theta \tan^2\theta$

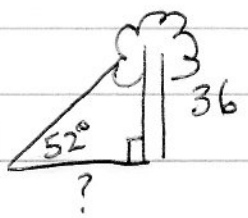
$= \frac{\cos^2\theta}{\sin^2\theta} * \frac{\sin^2\theta}{\cos^2\theta} = 1$

(15) C

(16) -2

	1	3	0	0	−2	4
		−2	−2	4	−8	20
	1	1	−2	4	−10	24

$\neq 0$, no

(17) 

$\tan 52° = \frac{36}{?} \rightarrow ? = \frac{36}{\tan 52°}$

(18) $f(g(x)) = (2x+1)^2 - 1$

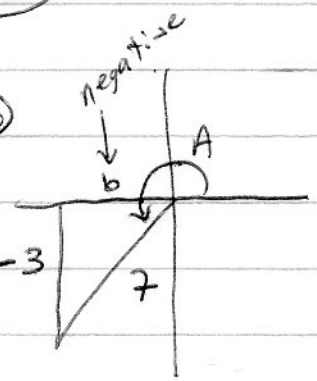
(19) $y = 2x^{1/3} + 27$

$x = 2y^{1/3} + 27$

$x - 27 = 2y^{1/3}$

$\frac{x-27}{2} = y^{1/3}$

$f^{-1}(x) = \left(\frac{x-27}{2}\right)^3$

(20) 

$\cos A = \frac{2\sqrt{10}}{7}$

$(-3)^2 + b^2 = 7^2$

$b^2 = 40$

$b = \sqrt{40}$ or $2\sqrt{10}$

(21) $\log_2(6-2x) - \log_2 x = 3$

$\log_2\left(\frac{6-2x}{x}\right) = 3 \rightarrow 2^3 = \frac{6-2x}{x} \rightarrow 8x = 6-2x$

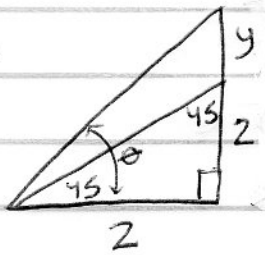
$10x = 6$

$x = 6/10$ or $3/5$

(22) $0 = \log(x-2) \rightarrow 10^0 = x-2$

$1 = x-2 \rightarrow x = 3$

(23)



$\tan\theta = \frac{2+y}{2} \rightarrow \tan\theta = 1 + \frac{1}{2}y$

$-1 + \tan\theta = \frac{1}{2}y$

$2(-1+\tan\theta) = y$

(24) period $= \frac{2\pi}{b}$ → period $= \frac{2\pi}{3}$

(25) C

(26) $\left(\frac{27x^6y^9}{x^3w^{-6}}\right) = 27x^3y^9w^6$

(27) $27^{1/3} = \sqrt[3]{27} = 3$

(28) $\sqrt[3]{24} * \sqrt[3]{x^3} * \sqrt[3]{y^{12}}$

$2\sqrt[3]{3} * x * y^4 = 2xy^4\sqrt[3]{3}$

(29) $\sqrt[3]{7x^2} = (7x^2)^{1/3}$

(30) $3 * 4 * x^{-2/3} * x^{1/2} = 12x^{-2/3+1/2} = 12x^{-1/6}$

(31) B only

(32) $2x^3 - 14x^3 - 6x^3 + 5x^2 - 4x^2 + 12x + 3$

$-18x^3 + x^2 + 12x + 3$

(33) $6x^2 + 27x - 14x - 63 \rightarrow 6x^2 + 13x - 63$

(34) $(x+4)(x-3)$

(35) $\frac{3x+1}{x^2-2x}$ Domain: $x \in \mathbb{R}, x \neq \{0, 2\}$

or $(-\infty, 0) \cup (0, 2) \cup (2, \infty)$

(36) $3 - x \geq 0 \rightarrow -x \geq -3 \rightarrow x \leq 3$

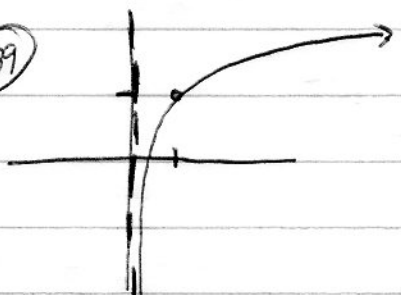
(37) vertical translation up 2 units

y-axis reflection

(38) $x = \sqrt{y}$

y	0	1	4	9
x	0	1	2	3

(39)



x	1	10
y	1	2

(40) $\sqrt{a^{10}} = \sqrt{4900}$

$a^5 = \pm 70$

(41) $\tan\frac{2\pi}{3} = \frac{\sin\frac{2\pi}{3}}{\cos\frac{2\pi}{3}} = \frac{+\sqrt{3}/2}{-1/2} = -\sqrt{3}$

(42) $\cos\frac{\pi}{2} = 0$

(43) $\frac{-q \pm \sqrt{q^2 - 4(pr)}}{2p} = x$

(44) $g(f(2)+2) = g(1+2) = g(3) = 3$

(45) $x+3 < 7$ and $x+3 > -7$

$x < 4$ and $x > -10$

$-10 < x < 4$ or $(-10, 4)$

(46) $\frac{(x+h)^2 - x^2}{h} = \frac{x^2+2xh+h^2-x^2}{h} = \frac{h(2x+h)}{h}$

$= 2x+h$

(47) $(x-h)^2 + (y-k)^2 = r^2$

$(x-1)^2 + (y+3)^2 = 16$

(48) $3x - y = -4$

$3x + 4 = y$

any line w/ slope $-1/3$

e.g. $y = -\frac{1}{3}x + 7$

(49) B only

(50) $6x - x^2 = 9$

$0 = x^2 - 6x + 9$ only one

$0 = (x-3)^2$

$x = 3$ only

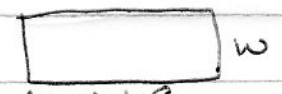
(51) area of circle: $\pi(1)^2 = \pi$ ratio: $\frac{\pi}{4}$
area of square: $2^2 = 4$

(52) $|x-3| \leq 4$ means $x-3 \leq 4$ and $x-3 \geq -4$
$x \leq 7$ and $x \geq -1$
check values in $|x-5|$: $[-1, 7]$
if $x=-1$, then $|x-5| = 6$

(53) B since $\sqrt{x^2} = |x|$ if x is not known to be positive

(54) $\frac{2xy(3x^3-y^3)}{2xy} = 3x^3-y^3$

(55) Crosses y-axis when $x=0$: $0-3y+12=0$
$-3y=-12$ $y=4$

(56) 

$A = w(w+8) = w^2+8w$

(57) $\sqrt{27\sqrt{81x^8y^6}} = \sqrt{27(9)(x^4)(y^3)} = (3\sqrt{3})(3)(x^2)(y\sqrt{y})$
$= 9x^2y\sqrt{3y}$

(58) $(x+4y=1)2 \rightarrow 2x+8y=2$
$3x+8y=2 \quad -3x+8y=2$
$-x=0$
$8y=2 \quad y=\frac{1}{4} \quad x=0$
one solution $(0, \frac{1}{4})$

(59) fraction = 0 when numerator = 0
$1-x=0$ $x=1$

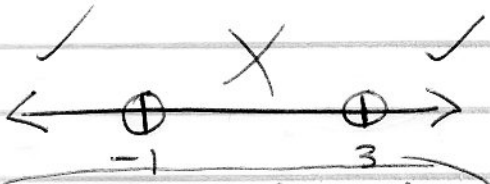
(60) five times
(still $x^5=0 \rightarrow 5$ answers)

(61) $(3-x)(1+x)<0$

$-x^2+2x+3<0$

$x^2-2x-3>0$

$(x-3)(x+1)>0$



$(-\infty,-1)\cup(3,\infty)$

or

$x<-1$ OR $x>3$

(62) $px+pq=qx-s$

$px-qx=-pq-s$

$x(p-q)=-(pq+s)$

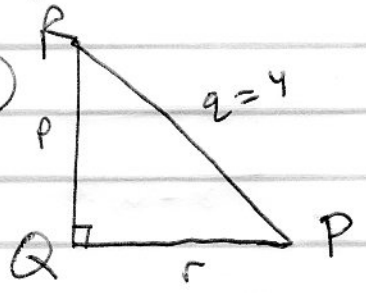
$$x=\frac{-(pq+s)}{p-q}$$

(63) $49^{?}=\left(\frac{1}{7}\right)$

$(7^2)^{?}=7^{-1}$ → $7^{2?}=7^{-1}$ → $2?=-1$

$?=-1/2$

(64)



$\csc P=5 \rightarrow \sin P=\frac{1}{5}$

$\sin P=\frac{p}{4}$ → $\frac{p}{4}=\frac{1}{5}$ $5p=4$

$p=4/5$

(65) $\frac{\sin\phi}{\cos\phi}\cdot\frac{\sin\phi}{\sin\phi\sin\phi}\cdot\frac{1}{\sin\phi}=\frac{1}{\cos\phi}=\sec\phi$

(66) get larger in the positive direction

(approach $+\infty$)

(67) $-2*\log_3 3=-2(1)=-2$

$(5/3, 0)$ is a point on both lines

(68) corner at $3x-5=0$

$x = 5/3$ ↳ $y=0$

slope left: -3

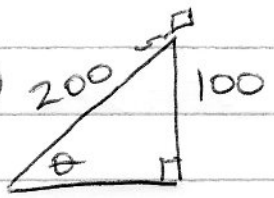
slope right: $+3$

left line: $y-0=-3(x-5/3)$

right line: $y-0=3(x-5/3)$

$$f(x)=\begin{cases} -3x+5, & x<5/3 \\ 3x-5, & x\geq 5/3 \end{cases}$$

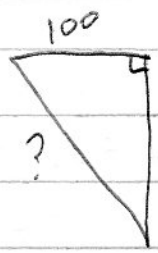
(69)



$\sin\theta = \frac{100}{200} \rightarrow \sin\theta = \frac{1}{2}$

$\theta = 30°$ or $\frac{\pi}{6}$ radians

(70)



$(100)^2+(200)^2 = ?^2$

$10{,}000 + 40{,}000 = ?^2$

$50{,}000 = ?^2$

$? = \sqrt{50{,}000}$

(71) $8*8=64$

(72) $x = \log_2 y$

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

(73) $y = y_0 e^{kt}$

$2.5 = 5e^{k(20)}$

$\frac{1}{2} = e^{20k}$ $\quad k \approx -0.034657359$

$1 = 5e^{-0.034657359t}$

$\ln(0.2) = -0.034657359t$

$t \approx 46.4386$ days

(74)

$$\frac{\frac{1}{x+h}\cdot\frac{(x)}{(x)} - \frac{1}{x}\cdot\frac{(x+h)}{(x+h)}}{\frac{h}{1}}$$

$$\left(\frac{x-(x+h)}{x(x+h)}\right) \div \frac{h}{1}$$

$$\frac{-h}{x(x+h)} * \frac{1}{h}$$

$$\frac{-1}{x(x+h)}$$