#26 Solve $3 \cdot 5^x = 10$ Algebraically

first divide both sides by 3

$$\frac{3 \cdot 5^x}{3} = \frac{10}{3}$$

$$5^x = \frac{10}{3}$$

Now change to logarithmics we get $\log_5\left(\frac{10}{3}\right) = x$

$$\frac{\log\left(\frac{10}{3}\right)}{\log 5} = x$$

$$\boxed{0.7481 = x}$$

#29 a) $f(x) = 3x^2 - 5x + 9$ this is a polynomial

Domain is all Real numbers $(-\infty, \infty)$

b) $g(x) = \dfrac{1}{x^3 - 4x} = \dfrac{1}{x(x^2-4)} = \dfrac{1}{x(x+2)(x-2)}$

So Domain is all Reals except $0, +2, -2$.

$\{x \mid x \neq 0 \text{ and } x \neq \pm 2\}$ Not a polynomial

c) $K(x) = \sqrt{3-x} \Rightarrow$ Domain $3 - x \geq 0$

Not a polynomial

$$-x \geq -3$$

$$\boxed{x \leq 3}$$

#30 a) Convert $3^4 = 81$ to logarithmic Notation.

$3^4 = 81 \longrightarrow \log_3 81 = 4$

b) Convert $\log_{25} 5 = \frac{1}{2}$ to exponential Notation

$25^{\left(\frac{1}{2}\right)} = 5 \longleftarrow \log_{25} 5 = \frac{1}{2}$

#31 See Next page

#33 If $f(x) = \frac{x}{7} - 3$ find $f^{-1}(x)$

step I) $y = \frac{x}{7} - 3$

step II) Solve for $x \Rightarrow 7y = x - 21$

$x = 7y + 21$

step III) $f^{-1}(y) = 7y + 21$

step IV) $f^{-1}(x) = 7x + 21$

#33b) $g(x) = 3^x \Longrightarrow g^{-1}(x) = \log_3 x$

#33c) $h^{-1}(3) \cong -1.2$ or -1.3

#31)

$y = ab^x$

$(0, 2) \Rightarrow 2 = ab^0 \Rightarrow \boxed{a = 2}$

$(3, 250) \Rightarrow 250 = 2(b)^3$

Now solve for b

$\frac{250}{2} = b^3$

$125 = b^3$

Now take cube root of both sides

$(125)^{1/3} = (b^3)^{1/3}$

$\boxed{5 = b}$

So, the equation should be $\boxed{y = (2)(5)^x}$

#32/ Given $f(x) = ax^2 + c$

a) If $a > 0$ the parabola opens upwards

example: $y = 2x^2 + 7$

If $a < 0$ the parabola opens downwards $y = -2x^2$

b) If $c > 0$ the vertex and y intercept are above the X-axis

Ex: $y = 2x^2 + 8$

vertex $(0, 8)$ & y intercept $(0, 8)$

If $c < 0$ the vertex and y intercept are below the x axis Example: $y = 2x^2 - 8$

vertex $= (0, -8)$ y intercept $(0, -8)$

Another Example: $y = 2x^2 - 10$

Vertex $= (0, -10)$ & y intercept $(0, -10)$

#33 Part (b) If $g(x) = 3^x$ find $g^{-1}(x)$

Step I) $y = 3^x$

Step II) Solve for x; $\log y = \log 3^x$

$\log y = x \log 3$

$\frac{\log y}{\log 3} = x$

$\log_3 y = x$

$x = \log_3 y$

Step III) $g^{-1}(y) = \log_3 y$

Step IV) $g^{-1}(x) = \log_3 x$

#33 C) $h^{-1}(3) \cong -1.2$ Because $h(-1.2) = 3$

#34

Table A

x	y
-1	4
0	0
1	0
2	4

-4 ?

Not Linear

Not exponential

Table B

x	y
-1	-2
1	-1
3	0
5	1

+1 +1 +1

Linear

$$\text{slope} = \frac{-1-(-2)}{1-(-1)} = \frac{-1+2}{2} = \frac{1}{2}$$

Table C

x	y
0	-5
1	-3
1	3
0	5

Same x has two y values thus this is Not a function

TABLE D

x	y
0	2
1	10
2	50
3	250

*5 *5 *5

This is exponential

a) Table B is Linear ; slope $= \frac{1}{2}$

b) Table D is exponential; for each unit increase in x the y is increased by Multiplicative factor of 5.

c) Table C is Not a function B/c same x has two y values

#35) a) $\dfrac{5x}{x^2+x-6} - \dfrac{6}{x^2-x-2} = \dfrac{5x}{(x+3)(x-2)} - \dfrac{6}{(x-2)(x+1)}$

$= \dfrac{5x(x+1)-6(x+3)}{(x+3)(x-2)(x+1)} = \dfrac{5x^2+5x-6x-18}{(x+3)(x-2)(x+1)} = \dfrac{5x^2-x-18}{(x+3)(x+1)(x-2)}$

$= \dfrac{(5x+9)\cancel{(x-2)}}{(x+3)(x+1)\cancel{(x-2)}} = \boxed{\dfrac{5x+9}{(x+3)(x+1)}}$

#35 b) $\dfrac{4x^2-9}{x^2-3x+2} \div \dfrac{2x^2-x-3}{x^2-1} = \dfrac{(2x+3)\cancel{(2x-3)}}{(x-2)\cancel{(x-1)}} \cdot \dfrac{\cancel{(x+1)}\cancel{(x-1)}}{\cancel{(2x-3)}\cancel{(x+1)}}$

$= \boxed{\dfrac{2x+3}{x-2}}$

#36) a) $4x^3-49x=0$

$x(4x^2-49)=0$

$x(2x+7)(2x-7)=0$

$\boxed{x=0}$ $\boxed{x=\frac{-7}{2}}$ $\boxed{x=\frac{7}{2}}$

b) $6x^2+11x=10$

$6x^2+11x-10=0$

$(3x-2)(2x+5)=0$

$\boxed{x=\frac{2}{3}}$ $\boxed{x=\frac{-5}{2}}$

c) $9x^2-30x+25=0$

$(3x-5)(3x-5)=0$

$\boxed{x=\frac{5}{3}}$

#37) a)

$$6x^2 - 7x = 3$$

$$6\left(x^2 - \frac{7}{6}x\right) = 3$$

$$x^2 - \frac{7}{6}x = \frac{1}{2}$$

$$\left(\frac{\frac{7}{6}}{2}\right)^2 = \frac{49}{144}$$

$$x^2 - \frac{7}{6}x + \frac{49}{144} = \frac{1}{2} + \frac{49}{144}$$

$$\left(x - \frac{7}{12}\right)^2 = \frac{121}{144}$$

$$x - \frac{7}{12} = \pm \frac{11}{12}$$

$$x = \frac{7}{12} \pm \frac{11}{12} = \frac{18}{12} \text{ or } \frac{-4}{12}$$

$$= \frac{3}{2} \text{ or } \frac{-1}{3}$$

b)

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

$$2x^2 - 8x = 3x - 3$$

$$2x^2 - 8x - 3x = -3$$

$$2x^2 - 11x = -3$$

$$2\left(x^2 - \frac{11}{2}x\right) = -3$$

$$x^2 - \frac{11}{2}x = \frac{-3}{2}$$

$$x^2 - \frac{11}{2}x + \frac{121}{16} = \frac{-3}{2} + \frac{121}{16}$$

$$\left(x - \frac{11}{4}\right)^2 = \frac{97}{16}$$

$$x - \frac{11}{4} = \pm \frac{\sqrt{97}}{4}$$

$$x = \frac{11}{4} \pm \frac{\sqrt{97}}{4}$$

$$x = \boxed{5.21}, \quad \boxed{0.288}$$

Good Luck

#38 Solve the following symbolically

a) $\log_{17} 17^{x+2} = \log_7 1$

Note: $\boxed{\log_{17} 17 = 1}$ and $\boxed{\log_7 1 = 0}$

$(x+2)\log_{17} 17 = 0$

$x + 2 = 0$

$\boxed{x = -2}$

b) $7\left(e^{2x}\right)^3 = 35$

$e^{6x} = \frac{35}{7} \implies e^{6x} = 5$

$\ln e^{6x} = \ln 5$

$6x = \ln 5$

$\boxed{x = \frac{\ln 5}{6}}$

c) $7^{x^2-x} = 7^6$

$x^2 - x = 6$

$x^2 - x - 6 = 0$

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

$\boxed{x=3}$ $\boxed{x=-2}$

d) $\log_3 5x = 4$

$5x = 3^4$

$5x = 81$

$\boxed{x = \frac{81}{5}}$