***Pre-Calculus 11***

***Unit 3: Solving Quadratic Equations***

***Worksheet 3.5 – Interpreting the Discriminant***

1. Calculate the value of the discriminant. Use the discriminant to determine the nature of the roots. (ie. There are one, two, or no real roots)
2. $x^{2}+11x+24=0$ b) $n^{2}-4n+2=0$ c) $4m^{2}-20m+25=0$

d) $2x^{2}-5x+8=0$ e) $3q^{2}+13q-10=0$ f) $7p^{2}+12p+6=0$

1. Without solving each equation, determine the nature of the roots. Justify your answer.
2. $w^{2}+5=3w$ b) $3-5t=t^{2}$ c) $25+x^{2}=-10x$

d) $9n^{2}=5n$ e) $0.5x^{2}+4x+4=0$ f) $\left(x+1\right)\left(x-2\right)=4$

g) $4\left(x^{2}-5x+5\right)=-5$ h) $2\left(y^{2}+3\right)=4y$ i) $\sqrt{5}x^{2}+7x+2\sqrt{5}=0$

j) $\frac{1}{3}x^{2}+\frac{1}{2}x-1=0$ k) $\frac{x-1}{2}-x^{2}=3$ l) $\frac{3x-1}{3}-\frac{2x+1}{2}=x^{2}$

1. Determine the value(s) of k that give the type of solution indicated.
2. $x^{2}-6x+k=0$; one real root b) $kx^{2}-2x+1=0$; two real roots

c) $x^{2}+4x-2k=0$; no real roots d) $2kx^{2}-4x+3=0$; two real roots

e) $m^{2}+4km+1=0$; one real root f) $\left(k+1\right)x^{2}-2x-3=0$; no real roots

g) $y^{2}+\left(k+2\right)y+2k=0$; one real root h) $2x^{2}+5x-2\left(k-1\right)=0$; no real roots

1. \*Show that if k is any real number, each equation always has real roots.
2. $kx^{2}+\left(3k+2\right)x+\left(2k+3\right)=0$ b) $\left(k+1\right)x^{2}+2kx+\left(k-1\right)=0$
3. Journal Prompt: Summarize everything that you have learned in this unit into a one page study guide. Consider major ideas and question types.

***Solutions***

1. a) Two Real Roots b) Two Real Roots c) One Real Root d) No Real Roots

e) Two Real Roots f) No Real Roots

2. a) No Real Roots b) Two Real Roots c) One Real Root d) Two Real Roots

 e) Two Real Roots f) Two Real Roots g) One Real Root h) No Real Roots

 i) Two Real Roots j) Two Real Roots k) No Real Roots l) No Real Roots

3. a) $k=9$ b) $k<1$ c) $k<-2$ d) $k<\frac{2}{3}$

 e) $k=\pm \frac{1}{2}$ f) $k<-\frac{4}{3}$ g) $k=2$ h) $k<-\frac{9}{16}$

4. a) $Discriminant=k^{2}+4$ This will always be positive resulting in two real roots

 b) $Discriminant=4$ This is positive resulting in two real roots