

Name:

Date:

SOLUTION 4

1. Consider the polynomial $g(x) = 4x^2 - 8x - 6$ with roots p and q . What are $p + q$, pq , $p^2 + q^2$? You must show all work for credit.

$$\begin{aligned}4x^2 - 8x - 6 &= 4\left(x^2 - 2x - \frac{3}{2}\right) \\ &= 4(x - p)(x - q) \\ &= 4x^2 - 4(p + q)x + 4pq\end{aligned}$$

Thus we see that $-8x = -4(p + q)x$ so $2 = p + q$ and $-6 = 4pq$ so $-3/2 = pq$. Finally we use the identity from class and see that

$$4 = (p + q)(p + q) = p^2 + 2pq + q^2 = p^2 + q^2 - 3.$$

Thus $p^2 + q^2 = 7$.

2. Model a quadratic equation that passes through the points $(0, 0)$, $(2, 0)$, and $(1, -2)$. You must show all work for credit.

The general quadratic function is $f(x) = ax^2 + bx + c$. Thus plugging in the points we get the following system of equations.

$$\begin{cases} 0 = c \\ 0 = 4a + 2b + c \\ -2 = a + b + c \end{cases}$$

Therefore, $c = 0$ so we have the system:

$$\begin{cases} 0 = 4a + 2b \\ -2 = a + b \end{cases}$$

So we see that $b = -a - 2$ and plugging back into the first equation we get:

$$0 = 4a + 2(-a - 2) = 2a - 4$$

Therefore $a=2$. Plugging back into $b = -a - 2$ we get $b = -4$. Thus our modelled quadratic is

$$f(x) = 2x^2 - 4x.$$