Quiz 2

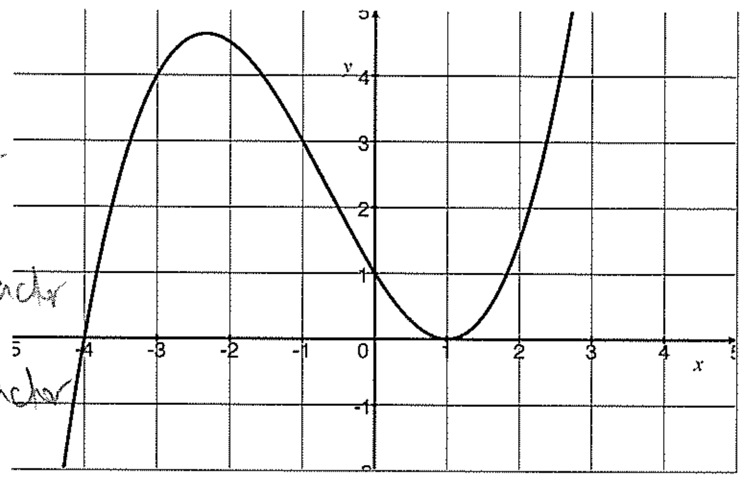
Key

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.

1. [3] (Poly2Wks #2) Let f be the graph below and to the right. Given that the graph is of a degree three polynomial, find the algebraic rule for the function.

1) { -4 is a root $\Rightarrow$ $x - {-4}$ is a factor
{ 1 is a root $\Rightarrow$ $x-1$ is a factor

+1) { crosses @ $-4 \Rightarrow$ $(x - {-4})$ is a factor
{ touches @ $x=1 \Rightarrow (x-1)^2$ is a factor



So $y = \underbrace{a}_{+.5}(x+4)(x-1)^2$ thru $(0,1)$ so

$1 = a(0+4)(-1)^2$

$1 = a \cdot 4$

$1/4 = a$ +.5

So $1/4(x+4)(x-1)^2 = y$

2. [2] (§2.2 #96) Write a polynomial p that satisfies the following criteria:

- as $x \to \infty$, then $y \to -\infty$ — negative leading coef +.5
- -2, 1, and 3 are roots. $\Rightarrow$ $(x-3)(x-1)(x-{-2})$ +1

Note: there is more than one right answer!

2

So $-2(x-3)(x-1)(x+2)$ works

+.5

3. (WebHW13 #6) The area of a rectangle is $5x^4 - 15x^3 + 22x^2 - 6x + 8$ cm^2. It's length is $x^2 - 3x + 4$ cm.

(a) [2] If the length is 4cm what are the possible areas of the rectangle?

(+.5) $\cancel{4} = x^2 - 3x + 4$
$\cancel{-4} \qquad -4$
$0 = x^2 - 3x$
$0 = x(x-3)$
(+1) $x = 0$ $\qquad$ $x - 3 = 0$
$x = 3$

(+.5) If $x = 0$ the area is
$5 \cdot 0^4 - 15 \cdot 0^3 + 22 \cdot 0^2 - 6 \cdot 0 + 8$
or 8 cm^2
If $x = 3$ the area is
$5(3)^4 - 15 \cdot 3^3 + 22 \cdot 3^2 - 6 \cdot 3 + 8$
or $\cancel{405} - \cancel{405} + 198 - \cancel{18+8}$
$= 198$

(b) [3] Find the rectangle's width.

(+.5) area = width · length
$\Rightarrow$ width = $\frac{\text{area}}{\text{length}} = \frac{5x^4 - 15x^3 + 22x^2 - 6x + 8}{x^2 - 3x + 4}$

long division?

algorithm (+.5)

(+1) (+.5) (+.5)

$5x^2 + 2$ R 0

$x^2 - 3x + 4 \overline{) \cancel{5x^4} - \cancel{15x^3} + 22x^2 - 6x + 8}$
$-(\cancel{5x^4} - \cancel{15x^3} + 20x^2)$
$2x^2 - 6x + 8$
$-(2x^3 - 6x + 8)$
0

note: if length is 4 then width = 2 or 47

So $5x^2 + 2$