Quiz 3 Key

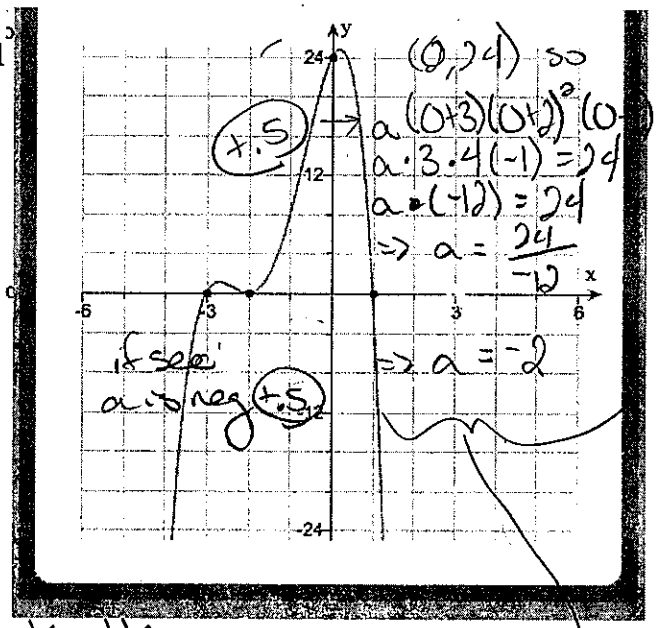
Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.

1. [2] (WebHW6 #2 & exponential wks #1) TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F.

(T) F $f(x) = \dfrac{3x^6 + 5x^4}{7}$ is a polynomial. $\frac{3x^6}{7} + \frac{5x^4}{7} = \frac{3}{7}x^6 + \frac{5}{7}x^4$

T (F) $x^5 \cdot x^2 = x^{10}$. $x^5x^2 = (xxxxx)(xx) = x^7$

2. [3] (WebHW6 #18) The graph of a polynomial function p is given. Assume that when p is completely factored, each real zero, c corresponds to a factor of the form $(x-c)^m$. Find the equation of least degree for p.



(0, 24) so
$a(0+3)(0+2)^2(0-1) = 24$
$a \cdot 3 \cdot 4 \cdot (-1) = 24$
$a \cdot (-12) = 24$
$\Rightarrow a = \frac{24}{-12}$
$\Rightarrow a = -2$

+.5 if see a is neg +.5

Note
-3 is a root
$\Rightarrow (x-(-3))$ is a factor (+.5)

-2 is a root
$\Rightarrow (x-(-2))$ is a factor (+.5)

1 is a root
$\Rightarrow (x-1)$ is a factor (+.5)

So looks like
$a(x+3)(x+2)^2(x-1) = y$
$-2(x+3)(x+2)^2(x-1) = y$

Note at $x=-3$ the graph passes thru the x-axis
$\Rightarrow$ the power on $(x-(-3))$ is odd

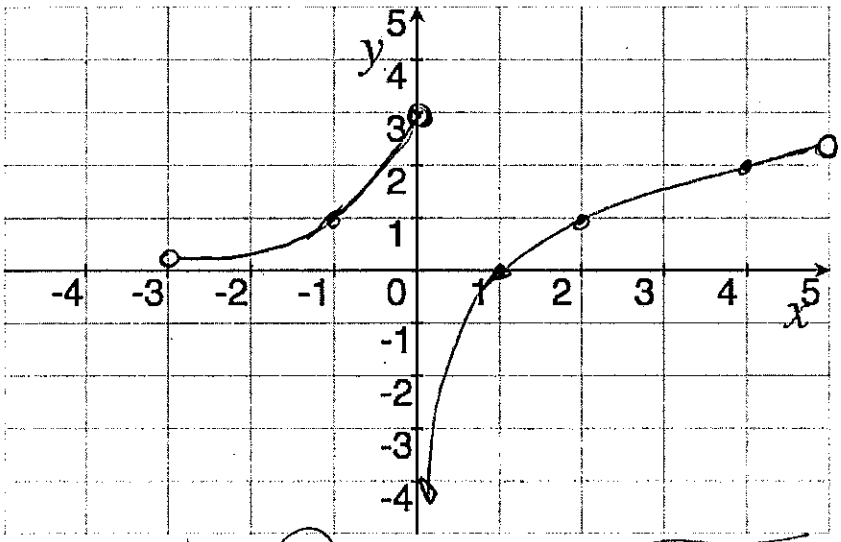
Note at $x=-2$ the graph touches but does not cross the x-axis
$\Rightarrow$ the power on $(x-(-2))$ is even. (+.5)

Note at $x=1$ the graph passes thru the x-axis
$\Rightarrow$ the power on $(x-1)$ is odd

3. [3] (WebHW7 #15 & 22) Carefully graph h on the axes provided where h is the piecewise defined function:

$$h(x) = \begin{cases} 3^{x+1} & \text{if } -3 \le x < 0 \\ \log_2(x) & \text{if } 0 \le x < 5 \end{cases}$$

graph of 3^x shifted to the left 1 unit +.5



shape +.5
shift +.5
endpoints +1
+.5
+.5

4. [2] Determine if $x+3$ if a factor of the function $y = 2x^3 - 9x + 5$. Provide justification.

$x+3$ is a factor if there is some polynomial $p(x)$ so that

$2x^3 - 9x + 5 = (x+3)p(x)$.

$\Rightarrow \dfrac{2x^3 - 9x + 5}{x+3} = p(x)$

$\Rightarrow x+3$ evenly divides $2x^3 - 9x + 5$

$\Rightarrow$ there is no remainder so

$$x+3 \overline{)\,2x^3 + 0x^2 - 9x + 5} \quad 2x^2 - 6x + 9 \text{ R } -22$$

$-(2x^3 + 6x^2)$

$-6x^2 - 9x$

$-(-6x^2 - 18x)$

$9x + 5$

$-(9x + 27)$

+.5 long division algorithm +1

so No +.5

or

+1 $x+3$ is a factor if and only if -3 is a root/zero/x-intercept of $2x^3 - 9x + 5$.

So check by letting $x = -3$

$2(-3)^3 - 9(-3) + 5$

$2(-27) + 27 + 5$ alg +.5

$-54 + 27 + 5$

$-27 + 5 = -22 \neq 0$

+.5 So No