# Quiz 3

Key

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

1. [3] (WebHW6 #13) Divide $\dfrac{18x^2+15x-25}{6x-5}$ $= 3x+5$ w/ no remainder

$$\begin{array}{r} 3x+5 \\ 6x-5\overline{)\,18x^2+15x-25} \\ -(18x^2-15x) \\ \hline 30x-25 \\ -(30x-25) \\ \hline 0 \end{array}$$

(+1) (+.5) (+.5) R0

algorithm (+1)

2. [2] (Exponent Wks #2) Simplify $\left(\dfrac{x^5}{2y^{-3}}\right)^{-3}$

$$\frac{(x^5)^{-3}}{(2y^{-3})^{-3}} = \frac{(x^{-5})^{-3}}{2^{-3}(y^{-3})^{-3}} = \frac{x^{-15}}{2^{-3}y^{9}}$$

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

$(x^2)^3 = x^2x^2x^2 = x^6$

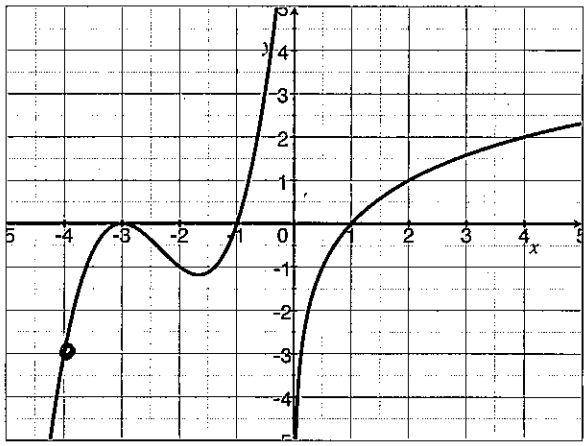
$$= \frac{2^3}{y^9x^{15}} = \frac{8}{y^9x^{15}} \quad \text{or} \quad 8y^{-9}x^{-15}$$

got it (+.5)

3. [5] (§2.3 #38 & §3.2 #62)
The piecewise defined function $h$ is graphed on the right and is of the form:

$$h(x) = \begin{cases} p(x) & \text{if } x < 0 \\ \log_b(x) & \text{if } 0 < x \end{cases}$$

where $p(x)$ is a polynomial that when completely factored is of the form $(x-c)^m$ and is of degree three. Find the (the algebraic rule for the) function $h$.



-3 is a root => $(x-3)$ or $(x+3)$ is a factor } (+1)
-1 is a root => $(x-1)$ or $(x+1)$ is a factor }

So of the form $a(x+3)^m(x+1)^n$

note graph does not cross at -3 => degree of $(x+3)$ is even (+1)

So of the form $a(x+3)^2(x+1)$

note; passes thru $(-4,-3)$ so if $x=-4$, $y=-3$ } (+.5)

$$a(-4+3)^2(-4+1) = -3$$
$$a(-1)^2(-3) = -3$$
$$\Rightarrow a = 1$$

So $p(x) = (x+3)^2(x+1)$

Note $(2,1)$ is on the graph of $\log_b(x) = y$ so

(+1) $\log_b 2 = 1 \iff b^1 = 2$ so $b = 2$ (+1)

So $\log_2(x)$

So $h(x) = \begin{cases} (x+3)^2(x+1) & \text{if } x<0 \\ \log_2(x) & \text{if } 0<x \end{cases}$ polynomial (+5)