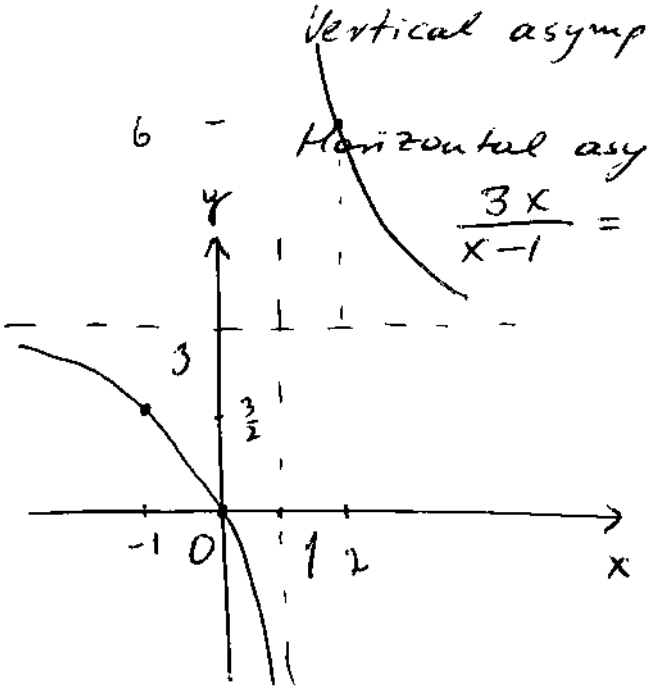
Wed, Sep. 24, 2008 **MATH 255a** **Quiz 1**

Name: (print) Solutions

Each problem is worth 2 points. Justify your answers, show all work.

1. For the function $y = \frac{3x}{x-1}$ find the horizontal and vertical asymptotes, x- and y-intercepts and sketch the graph.



vertical asymptote $x-1=0$

$\Rightarrow x = 1$

Horizontal asymptote:

$\frac{3x}{x-1} = \frac{3}{1-\frac{1}{x}} \approx 3$ when $|x|$ is large

$\Rightarrow y = 3$

$x=0 \Rightarrow y=0$

$y=0 \Rightarrow \frac{3x}{x-1} = 0 \Rightarrow 3x = 0$

$\Rightarrow x = 0$

the origin $(0,0)$ is the only x-y-intercept

2. Solve: $\log_3(2x+5) = 2$.

$2x+5 = 3^2 = 9$

$2x = 4$

$x = 2$

Please turn over...

3. The half-life of radium 226 is 1620 years. How much of a sample weighing 2.0 g will remain after 100 years?

$$y = y_0 e^{kt}$$

$$\frac{1}{2} = 1 \cdot e^{k\,1620}$$

$$k \cdot 1620 = \ln \frac{1}{2}$$

$$k = \frac{\ln \frac{1}{2}}{1620}$$

$$y = 2 \cdot e^{k \cdot 100} = 2\, e^{\frac{\ln \frac{1}{2}}{1620} \cdot 100}$$

$$= 2 \left(e^{\ln \frac{1}{2}}\right)^{\frac{100}{1620}}$$

$$= 2 \left(\frac{1}{2}\right)^{\frac{5}{81}}$$

$$= 2^{1-\frac{5}{81}} = 2^{\frac{76}{81}} \approx 1.916.$$