Name_____ Instructor_____ Section_____

Questions 16 - 18 are free response. Pages 6 and 7 should be turned in with your Answer Sheet. To receive credit please show all (correct) work.

16. Graph the function $f(x)=\dfrac{2x^2+14x-120}{x^2-7x-30}=\dfrac{2(x-5)(x+12)}{(x+3)(x-10)}$.

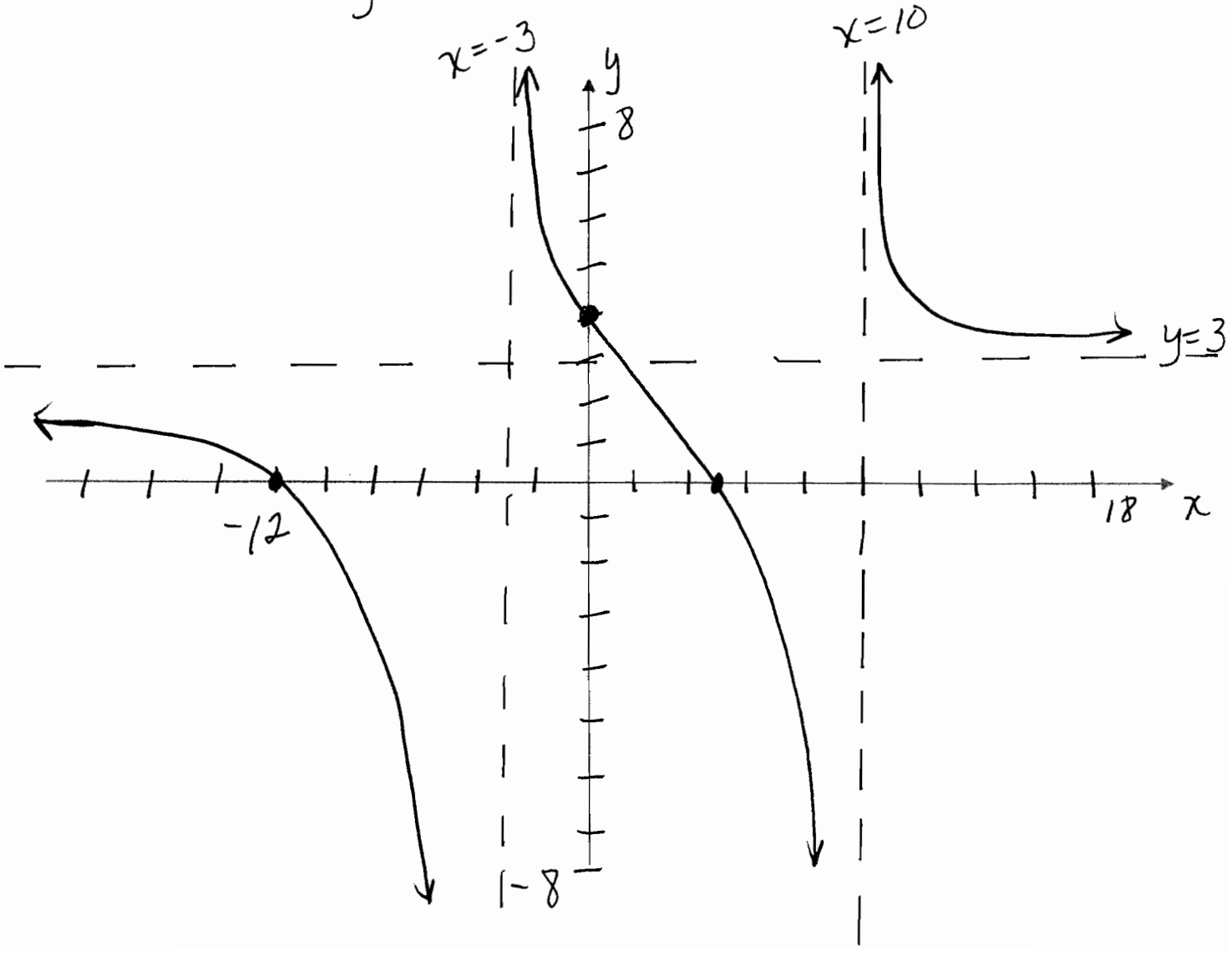
Determine each of the following:

x-intercept(s) $(5,0),(-12,0)$

y-intercept $(0,4)$

Vertical asymptote(s) $x=-3,\ x=10$

Horizontal asymptote $y=2$



17. The **half-life** of radioactive lead-210 is 21.7 years.
Find the decay constant (the rate of decay), correct to four decimal places.

$A = A_0 e^{rt}$

$\frac{1}{2}A_0 = A_0 e^{r(21.7)}$

$.5 = e^{21.7r}$

$\ln .5 = \ln e^{21.7r}$

$\ln .5 = 21.7r \cdot \ln e$

$\ln .5 = 21.7r \Rightarrow r = \frac{\ln .5}{21.7} \approx -.0319$

18. Let $y = 3\sin\left(2x + \frac{\pi}{2}\right)$. Determine each of the following.

3 amplitude

2 frequency

π period $\longrightarrow \frac{2\pi}{B} = \frac{2\pi}{2} = \pi$

$-\pi/4$ phase shift $\longrightarrow -\frac{C}{B} = -\frac{\pi/2}{2} = -\frac{\pi}{4}$

Determine the guidepoints, showing how you found them.

$0 \le 2x + \frac{\pi}{2} \le 2\pi$

$-\frac{\pi}{2} \le 2x \le \frac{3\pi}{2}$

$-\frac{\pi}{4} \le x \le \frac{3\pi}{4}$

Guidepoints

$-\frac{\pi}{4}$

$-\pi/4 + \frac{\pi}{4} = 0$

$0 + \pi/4 = \pi/4$

$\pi/4 + \pi/4 = \frac{\pi}{2}$

$\pi/2 + \pi/4 = 3\pi/4$

Then graph the function for one complete cycle.