Quiz 4

Name: _____

Lucky has been gaining weight so fast that his owner believes his weight follows an exponential model. When he was 6 months old, his weight was 2kg. When he was 2 years old, his weight was 7 kg.

(a) Find an function $f(t)$ of exponential type describing Lucky's weight when he is t years old.

Want: $f(t) = A_0 \cdot b^t$

$f(0.5) = 2 \Rightarrow A_0 \cdot b^{\frac{1}{2}} = 2$

$f(2) = 7 \Rightarrow A_0 \cdot b^2 = 7$

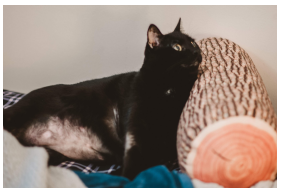

Figure 1: Lucky

$\Rightarrow \frac{b^2}{b^{\frac{1}{2}}} = \frac{7}{2} \Rightarrow b^{\frac{3}{2}} = \frac{7}{2} \Rightarrow b = \left(\frac{7}{2}\right)^{\frac{2}{3}}$

$A_0 \left(\frac{7}{2}\right)^{\frac{2}{3}\cdot\frac{1}{2}} = 2 \Rightarrow A_0 \left(\frac{7}{2}\right)^{\frac{1}{3}} = 2$

$\Rightarrow A_0 = 2 \cdot \left(\frac{2}{7}\right)^{\frac{1}{3}}$

$f(t) = 2\left(\frac{2}{7}\right)^{\frac{1}{3}} \left(\frac{7}{2}\right)^{\frac{2}{3}t}$

(b) According to the function you found in part a, what is Lucky's weight when he is 10 years old?

$f(10) = 2 \cdot \left(\frac{2}{7}\right)^{\frac{1}{3}} \cdot \left(\frac{7}{2}\right)^{\frac{2}{3}\cdot 10} \sim 55.82$ kg

(c) Is Lucky's owner right when she claims that Lucky's weight is following an exponential model? Why? (typically domestic cats live for 15-20 years)

No, a cat can't weigh that much.