Name: **Key**

1. [**2 parts, 1 point each**] For each of the following functions, find $f(-2)$.

(a) $f(x) = x^3 + 1$

$f(-2) = (-2)^3 + 1$

$= -8 + 1 = \boxed{-7}$

(b)

x	-3	-2	-1	0	1	2	3	4
$f(x)$	5	8	1	0	4	3	9	6

$f(-2) = \boxed{8}$

2. [**2 points**] The gas mileage M of a car (in miles per gallon) is a function of the speed s of the car (in miles per hour). Translate the statement $M(40) = 35$ into English. Be sure to include proper units.

When a car travels at a speed of 40 miles per hour, it uses gas at the rate of 35 miles per gallon.

3. [**3 points**] Give the equation of the line passing through $(1,5)$ and $(4,-8)$ in the form $y = mx + b$.

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-8 - 5}{4 - 1} = \frac{-13}{3}$$

$y - y_1 = m(x - x_1)$

$y - 5 = \frac{-13}{3}(x - 1)$

$y - 5 = \frac{-13}{3}x + \frac{13}{3}$

$y = \frac{-13}{3}x + \frac{13}{3} + \frac{15}{3}$

$$\boxed{y = -\frac{13}{3}x + \frac{28}{3}}$$

4. [**3 parts, 1 point each**] Annual revenue R from a restaurant chain can be estimated by $R = 0.4t + 5.6$, where R is in billion dollars and t is in years since January 1, 2007.

(a) What is the slope of this function? Include units and interpret the slope in English.

- $m = 0.4$ billion dollars per year.

- This means that each year, the annual revenue increases by 0.4 billion dollars.

(b) What annual revenue does the function predict for ~~2007~~ 2011? Include units.

$t = 4$ years

$R = (0.4) \cdot 4 + 5.6 = 1.6 + 5.6 = \boxed{7.2 \text{ billion dollars}}$

(c) In which year is the annual revenue predicted to pass 11 billion dollars?

$11 = 0.4t + 5.6$

$5.4 = 0.4t$

$54 = 4t$

$t = 13.5$ years (since 2007)

So the revenue will pass $11 billion

in $\boxed{2020.}$