Piecewise Functions

For problems 1-3, evaluate each piecewise function at the given values of the independent variable.

1. $f(x)=\begin{cases}6x-1 & \text{if } x<0\\ 7x+3 & \text{if } x\geq 0\end{cases}$ a. $f(-3)$ b. $f(0)$ c. $f(4)$

2. $f(x)=\begin{cases}\dfrac{x^2-9}{x+2} & \text{if } x\leq -1\\ 6 & \text{if } x>-1\end{cases}$ a. $f(-3)$ b. $f(1)$

3. $f(x)=\begin{cases}2+x & \text{if } x<-4\\ -x & \text{if } -4\leq x\leq 2\\ \dfrac{1}{3}x & \text{if } x>2\end{cases}$ a. $f(2)$ b. $f(3)$

4. When a diabetic takes long-acting insulin, the insulin reaches its peak effect on the blood sugar level in about 3 hours. This effect remains fairly constant for 5 hours, then declines, and is very low until the next injection. In a typical patient, the level of insulin might be modeled by the following function.

$$f(t)=\begin{cases}40t+100 & \text{if } 0\leq t\leq 3\\ 220 & \text{if } 3<t\leq 8\\ -80t+860 & \text{if } 8<t\leq 10\\ 60 & \text{if } 10<t\leq 24\end{cases}$$

Here, $f(t)$ represents the blood sugar level at time t hours after the time of the injection. If a patient takes insulin at 6 am, find the blood sugar level at each of the following times.

a. 7 am b. 11 am c. 3 pm d. 5 pm

For problems 5-10, graph each piecewise function.

5. $f(x)=\begin{cases}x+3 & \text{if } x<-1\\ 2x-1 & \text{if } x\geq -1\end{cases}$

6. $f(x)=\begin{cases}x-1 & \text{if } x\leq 3\\ 2 & \text{if } x>3\end{cases}$