

Name:

Date:

Period:

**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.	$f(x) = \begin{cases} \frac{x^2 - 9}{x + 2} & \text{if } x \leq -1 \\ 6 & \text{if } x > -1 \end{cases}$	[a] $f(-3)$	[b] $f(1)$	
3.	$f(x) = \begin{cases} 2 + x & \text{if } x < -4 \\ -x & \text{if } -4 \leq x \leq 2 \\ \frac{1}{3}x & \text{if } x > 2 \end{cases}$	[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 three 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,** on a separate sheet of paper, write a piecewise function that describes each situation and answer any additional questions asked in the problem.

- For a cellular phone billing plan, \$50 per month buys 400 minutes or less. Additional time costs \$0.30 per minute. Let the monthly cost  $C(x)$  be a function of the time  $x$ .
- For a cellular phone billing plan, \$60 per month buys 450 minutes or less. Additional time costs \$0.35 per minute. Let the monthly cost  $C(x)$  be a function of the time  $x$ .
- Income tax is 5% on the first \$50,000 of income or less, and 8% on any income in excess of \$50,000. Let the tax  $T(x)$  be a function of the income  $x$ .
- In Missouri, income tax is 3.5% on the first \$9,000 of income or less, and 6% on any income in excess of \$9,000. Let the tax  $T(x)$  be a function of the income  $x$ .
- You have a summer job that pays time and a half for overtime. That means, if you work more than 40 hours in a week, your hourly wage for the extra hours is 1.5 times your normal rate of \$8 per hour.
  - How much will you get paid if you work 50 hours?
  - How much will you get paid if you work 28 hours?
- During a nine-hour snowstorm it snows at a rate of 1 inch per hour for the first two hours, at a rate of 2 inches per hour for the next six hours, and at a rate of 1 inch per hour for the final hour. Write a piecewise function that gives the depth of the snow during the snowstorm. Graph the function on a separate piece of graph paper (only use the 1<sup>st</sup> quadrant). How many inches of snow accumulated from the storm?