B3.1 #6

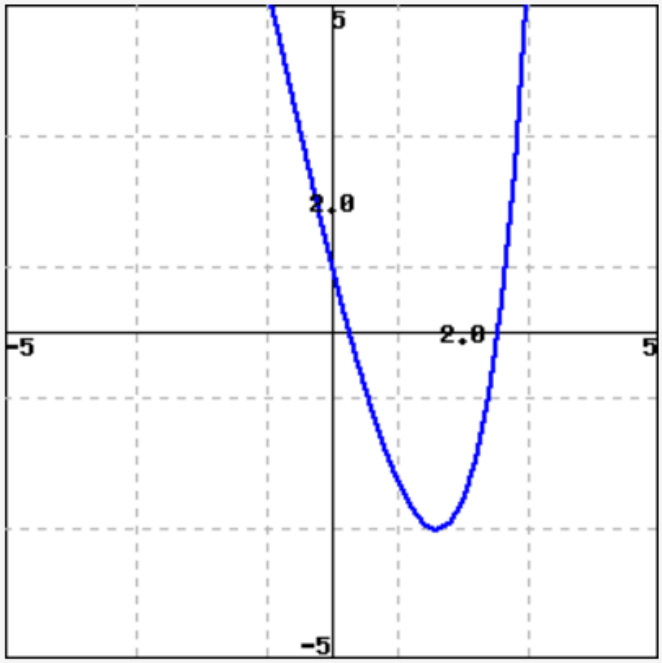
Find $f(3)$ and $f'(3)$, assuming that the tangent line to $y = f(x)$ at $x = 3$ has equation $y = 6x + 2$.

$f(3) =$

$f'(3) =$

B3.2 #13

The following is a graph of the function $f(x) = e^x - 5x$:



Sketch the graph of *f '(x).*

B3.6 #4

If $f(x) = 10\sin^2(x)$ then $f'(x) =$

B3.7 #9

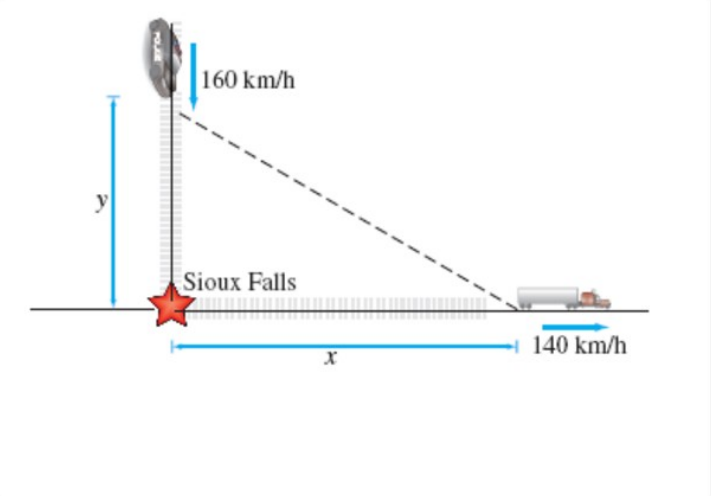
Given the following functions: $f(x) = \cos(x)$ and $g(x) = x^7 + 1$. Find:

$\frac{d}{dx} f(g(x)) =$

$\frac{d}{dx} g(f(x)) =$

B3.11 #10

A police car is traveling south on Hwy 43 toward Sioux City at 180 km/h and a truck is traveling east away from Sioux City, IA, at 120 km/h (See figure below).



At time $t_0 = 0$, the police car is 50 km north and the truck is 30 km east of Sioux Falls.

Calculate the rate at which the distance between the vehicles is changing after 10 minutes.

(Use decimal notation. Give your answer to three decimal places.)

The rate of change of the distance between the vehicles is

C4.4 #8

Find the critical points of $f(x)$ and use the Second Derivative Test (if possible) to determine whether each corresponds to a local minimum or maximum. Let

$$f(x) = xe^{-x^2}$$

Note: The function $\exp$ is another name for exponential function with base e. Thus, $\exp(t) = e^t$.

You must enter your critical points in ascending order.

Critical Point 1 = [ ] is what by the Second Derivative Test [?] ?

Critical Point 2 = [ ] is what by the Second Derivative Test [?] ?

C4.7 #2

Find a positive number x such that the sum of $25x$ and $\frac{1}{x}$ is as small as possible.

$x =$

Does this problem require optimization over an open interval or a closed interval?

- **A.** open
- **B.** closed

C4.9 #9

Evaluate this indefinite integral.

$$\int \frac{3}{5}\sin(x) - \frac{1}{4}\cos(x)\,dx \;=$$