

Show all your work.

Reasonable supporting work must be shown to earn credit.

1. [3] (SummationActivity #1) Expand $\sum_{i=2}^6 \left(\frac{(-1)^i}{i-3} \right)$.
(You do *not* need to compute or simplify this!)

2. Find the following.

(a) [2] (Week2Monday) $\int \sin(t) dt$

(b) [4] (WebHW5-4&5-3 #7) $\int_1^4 \frac{3 + \sqrt{x} + x}{x} dx$

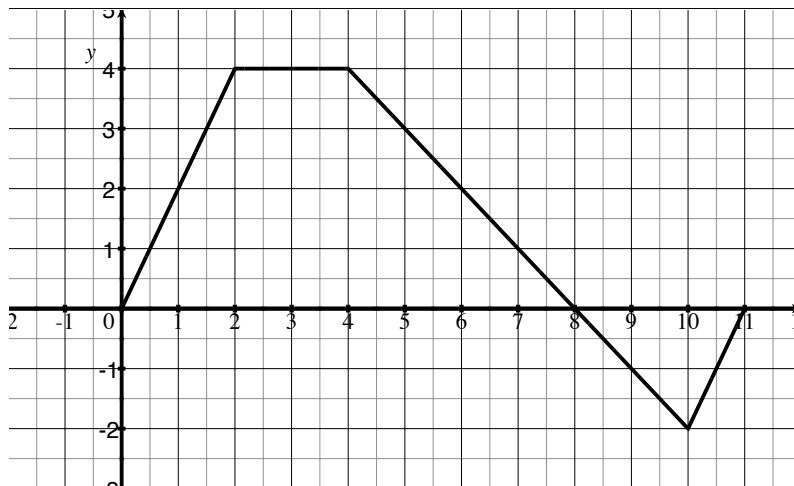
(c) [4] (WrittenHW5-5 #90) $\int \frac{2e^{0.4x}}{(1 + 5e^{0.4x})^2} dx$

3. Let $f(t)$ be the piece-wise defined function graphed below that is comprised of straight lines. The graph of f reports the velocity (m/s) of an electric vehicle moving on a straight track after t seconds. At $t = 0$, the vehicle is at the charging station.

Let $g(x) = \int_0^x f(t) dt$

- (a) [1] (Quiz1#1a)
Estimate $f(3)$.

- (b) [1] (WebHW5-3#7)
Estimate $f'(3)$.



- (c) [2] (WrittenHW5-3#4) Find $g(3)$, exactly.

- (d) [2] (WebHW5-4&5-3#9) Interpret $g(3)$ in terms of distance or velocity of the electric vehicle.

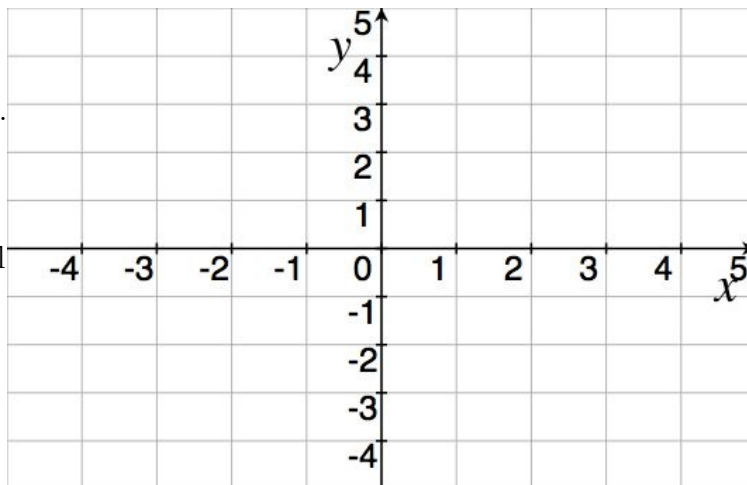
- (e) [2] (WrittenHW5-3#4) Estimate $g'(3)$.

- (f) [3] (WrittenHW5-4 #68, WrittenHW5-3#12) At what time is the vehicle farthest from the charging station? Justify your answer.

4. (SuggestedHW6-1#3) Consider the area trapped by $f(y) = y^2 - 2$, $g(y) = e^y$, $y = -1$, and $y = 1$.

(a) [3] Sketch and shade the region bounded by the curves.

(b) [4] Set up the definite integral (but do *not* compute!) that will find the area of the shaded region above.



5. Let $g(t)$ be a continuous function such that $\int_{-3}^1 g(t) dt = 3$ and $\int_1^4 g(t) dt = -1$. Find the following:

(a) [2] (DefiniteIntegralActivity#3) $\int_{-3}^4 5g(t) dt$

(b) [3] (Quiz1#2) $\int_{-3}^1 g(t) + 1 dt$

6. Each of the following is wrong. Explain why.

(a) [2] (Written5-3#66) $\int_0^\pi \sec^2(x) dx = \tan(x)|_0^\pi = 0$

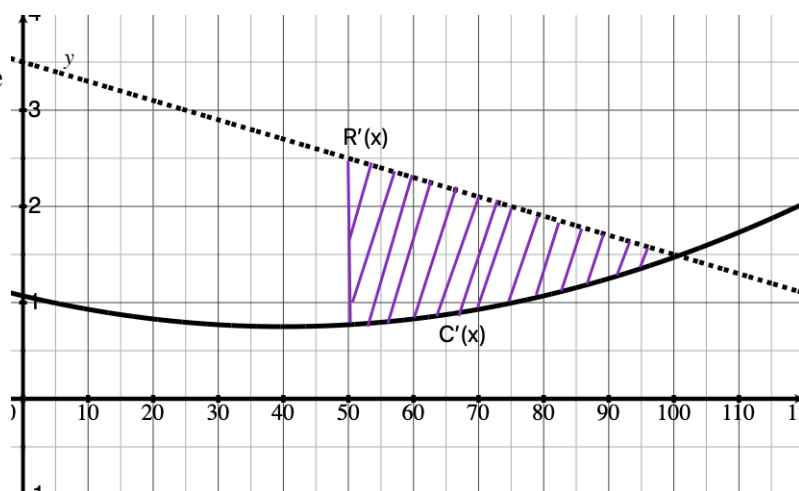
(b) [2] $\int_1^2 \frac{4}{x^3} dx = \int_1^2 4x^{-3} dx = 4(-3)x^{-4}|_1^2 = -12 \cdot 2^{-4} - (-12 \cdot (1)^{-4}) = -192 + 12 = 180$

7. The graph below shows the marginal revenue function $R'(x)$ and the marginal cost function $C'(x)$ for a manufacturer. Assume that R and C are measured in thousands of dollars.

(a) [2] (Quiz1#1) Shade the region described by

$$\int_0^{50} C'(x) dx.$$

(b) [3] (PracticeExam#11) What is the meaning of the area of the shaded region?



(c) [3] (WrittenHW5-1 #14) Approximate the area of the shaded region. Make sure it is clear what your approximation technique is!

8. [2] What concept did you study but not see on the exam?