Final Review – Last Day

Final Exam: Wednesday May 2 from 1:00 PM - 3:00 PM.

Section F01 (Faudree) Grue 208

Section F02 (Maxwell) Grue 206

Calculus Nutshell

1. limits
2. derivatives
3. integrals
4. How do you find/evaluate them and what do they tell you?

Chapter 5

1. (Warm-up) Evaluate.

   (a) $\displaystyle\int_0^{\pi/4} \frac{\sec^2 t}{\tan t + 1} dt$

   (b) $\displaystyle\int_1^4 \frac{x-2}{\sqrt{x}} dx$

(c) $\displaystyle\int \left(\sec x \tan x + \frac{2}{\sqrt{1-x^2}}\right) dx$

(d) $\displaystyle\int \frac{x}{(x-2)^3} dx$

2. A particle is moving with velocity $v(t) = 2t - \frac{1}{1+t^2}$ measured in meters per second.

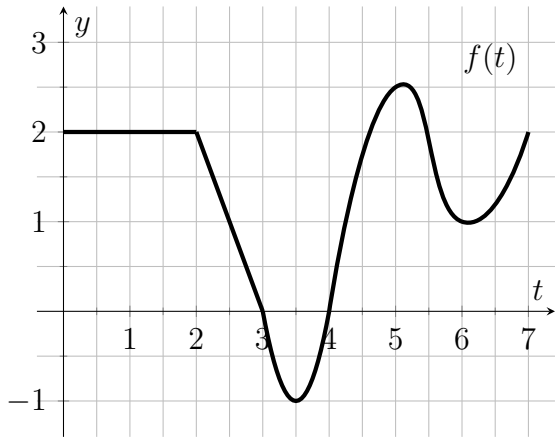
   (a) Find and interpret $v(0)$.

   (b) Find the displacement for the particle from time $t = 0$ to time $t = 4$. Give units with your answer.

   (c) If D is the *distance* the particle traveled over the interval $[0, 4]$, is D larger or smaller or exactly the same as your answer in part (b)? Justify your answer.

   (d) Assuming $s(0) = 1$, find the position of the particle.

3. The graph of $y = f(t)$ is displayed below. A new function is defined as $H(x) = \int_0^x f(t)\,dt$.



(a) Find $f(3)$.

(b) Find $g(3)$

(c) Find all x-values for which $g'(x) = 0$.

(d) Find all t-values for which $f'(t) = 0$.

(e) In the open interval $(0, 7)$, when does $g(x)$ have a maximum? A minimum?

(f) When is $g(x)$ increasing?

4. Find dy/dx for $y = \int_1^{\cos(x)} (1 + s^3)e^s \, ds$.

5. A bacteria population is 4000 at time $t = 0$ and its rate of growth is $1000 \times e^{t/2}$ bacteria per hour after t hours. What is the population after 4 hours?

6. What, if anything, is wrong with the following calculation?

$$\int_0^5 \frac{1}{x-2} dx = \ln(|x-2|) \Big|_0^5 = \ln(3) - \ln(2)$$