Chapter 5 Test   November 13, 2012   Name

1. What's the deal with Florida?!! Are they still counting votes there, one week after the election? It looks like they need some help analyzing their vote count rate. Estimate the number of votes counted using the rate table shown below, using a <u>trapezoidal</u> approximation method.

Time (Eastern Standard Time, starting 11/6)	9 pm	10 pm	12 am	1 am	2 am	4 am	7 am
Rate $\left(\frac{\text{thousands of ballots}}{\text{hour}}\right)$	15	18	20	22	20	16	13

2. Evaluate $\displaystyle\int_{-4}^{1} (|x + 2| + 1)\, dx$

3. Evaluate $\displaystyle\int_{-2}^{2} \frac{3^{x+1}}{6}\, dx$

4. Find $\dfrac{dy}{dx}$ **if** $y = \displaystyle\int_{2^{(3x+1)}}^{\csc(2x)} \left(t^2 - t\right) dt$

5. Write the following expression as a definite integral, <u>but do not evaluate the resulting integral</u>:

$$\lim_{n \to \infty} \left(\frac{1}{n}\right) \sum_{k=1}^{n} \frac{-1 + \left(3 + \frac{4k}{n}\right)}{\left(3 + \frac{4k}{n}\right)^3}$$

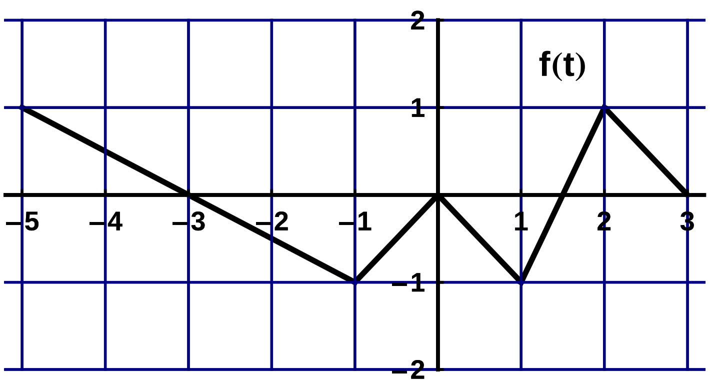
6. Find the average value of the following function, over the given interval, if $f(x) = 5 - \sqrt{16 - x^2}$ on $[0, 4]$

7. Find $g\left(\frac{-\pi}{6}\right)$ if $\int_{\frac{\pi}{3}}^{x} g(t)\, dt = \sin(2x)\cos(x)$

8. The curve below, $f(t)$ represents the <u>acceleration</u> of a particle on a coordinate axis, measured in $\frac{\text{meters}}{\text{second}^2}$.

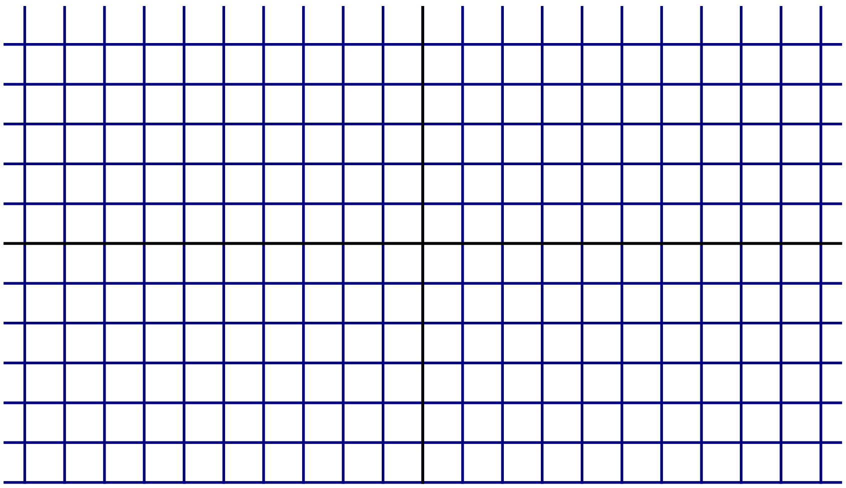
If the velocity of the particle is $v(t) = \int_{-1}^{t} f(z)\, dz$ $\frac{\text{meters}}{\text{second}}$, defined on $[-5, 3]$, answer the following

(a) graph the velocity function, $v(t)$, and the jerk function, $j(t)$, on the same coordinate axes
(b) Find the maximum velocity for this particle, and where it occurs
(c) Find the interval(s) where the acceleration is negative
(d) Find when the jerk is minimized



9. Use Simpson's Rule with $n = 4$ to approximate the value of $\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \csc x \, dx$ (simplify your answer).

10. Suppose $f(x) = x^2 + 2x + 4$ and P is the partition of $[-5, 5]$ into the five subintervals determined by $x_0 = -5$, $x_1 = -3$, $x_2 = -1$, $x_3 = 1$, $x_4 = 4$, and $x_5 = 5$. Draw the rectangles for the Riemann sum R_p, and evaluate, if $c_1 = -3$, $c_2 = -2$, $c_3 = -1$, $c_4 = 3$, and $c_5 = 4$.



11. Find K so that $\int_x^6 (3t^2 - 5)\,dt = K + \int_x^4 (3t^2 - 5)\,dt$

12. Find the linearization of $f(x) = \int_0^{2x} (2\ln 3)\,3^{2t}\,dt - 4$ at $x = \frac{1}{2}$

13. Use both definitions of the definite integral to set up limits that would represent the area "underneath the curve" of $y = 2x^2 + 3x - 1$ on the interval $[-3, 5]$. These have been started for you below. (do not evaluate the limits)

(i) $\int_{-3}^{5} \left(2x^2 + 3x - 1\right) dx = \lim \sum$

(ii) $\int_{-3}^{5} \left(2x^2 + 3x - 1\right) dx = \lim \sum$

14. Evaluate $\int_{-2}^{1} \left(x^2 + x\right)\left(\frac{4}{x} - 4\right) dx$