Name: _____ **Exam 3**

Math 151, Calculus I – Crawford **19 May 2019**

- Calculators, books, notes (in any form), cell phones, and any unauthorized sources are ***not*** allowed.
- You may use the given Unit Circle.
- Clearly indicate your answers.
- ***Show all your work*** – partial credit may be given for written work.
- ***Good luck***!

	Score
1	/8
2	/14
3	/12
4	/8
5	/8
6	/10
7	/28
8	/12
9	/2
Total	/100

1. (8 pts). Find the horizontal asymptote(s), if any, of the following function. [Justify your answer.]

$$f(x) = \frac{1 - 2x + 4x^2}{3x^2 - 1}$$

2. (14 pts). Suppose there are 27 ft^2 of material available to make a box with square base and an open top. Find the dimensions of such a box that will have the largest possible volume.

[Remember that significant partial credit will be given for clearly and accurately labeling a picture and setting up the problem.]

3. (12 pts). Given that $f''(x) = 2 - 3x$ and $f'(0) = 2$, $f(1) = 0$, find $f(x)$.

4. (8 pts). Determine a definite integral $\int_a^b f(x)\,dx$ that is equivalent to the given limit.

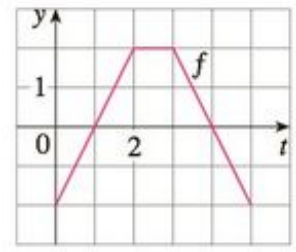
[Recall $\int_a^b f(x)\,dx = \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\Delta x$]

$$\lim_{n\to\infty} \sum_{i=1}^{n} \left[\left(1 + \frac{3}{n}i\right)^2 - \left(1 + \frac{3}{n}i\right) \right] \frac{3}{n}$$

5. (8 pts). Use the Fundamental Theorem of Calculus Part B/1 to find $F'(x)$ for

$$F(x) = \int_{-2}^{\sqrt{x}} \sin t \; dt$$

6. (10 pts). Let $g(x) = \int_0^x f(t)\, dt$ where f is the function graphed below.



(a). Find $g(0)$ and $g(4)$.

(b). On what interval(s) is g increasing?

7. (28 pts). Evaluate the following integrals. [Use integration techniques, ***NOT*** the limit definition.]

(a). $\int x^2\sqrt{x} - 5x + 6 \, dx$

(b). $\int_{\pi/6}^{\pi/3} \sin x$

(c). $\int \frac{x^2+1}{(x^3+3x)^4} \, dx$

8. (12 pts). The velocity of a particle is given below. Find the <u>total distance traveled</u> over $0 \leq t \leq 2$.

$v(t) = t^2 - 1$

9. (2 pts). TRUE or FALSE: If Newton's method is used to find the root of the equation $x - \cos(3x) = 0$, the equation for Newton's Method is given by

$$x_{n+1} = x_n - \frac{x_n - \cos(3x_n)}{1 + \sin(3x_n) \cdot 3}$$