Math 1300-005 - Spring 2017

Quiz 15/Final Review - 5/5/17

Guidelines: This quiz serves as a review for the final exam, covering material from the third midterm onwards. If you either a) stay the full class time working on the review, or b) complete the review and show me (the work must be good if not absolutely correct), then you recieve 7 out of 7 for today's quiz grade.

1. Find the area of the region enclosed by the graphs of $y = 3x^2$ and $y = -6x + 24$.

$3x^2 = -6x + 24$

$0 = -3x^2 - 6x + 24$

$0 = 3(-x^2 - 2x + 8)$

$x = -4, 2$

$3(0)^2 - 6x + 24 \leftarrow$ top

$\Big]_{-4}^{2}$ $\quad 3\int_{-4}^{2} (-x^2 - 2x - 8)\, dx$

2. (a) Compute $\lim_{x \to 2\pi} \dfrac{\int_{2\pi}^{x} \sqrt{10 - \sec(t)}\, dt}{x - 2\pi}$ $\Rightarrow \frac{0}{0}$

(b) Compute $\lim_{h \to 0} \dfrac{\int_{7}^{7+h} \arctan(t)\, dt - \int_{0}^{7} \arctan(t)\, dt}{h}$

5. Below is a table representing the speed of a car in ft/s during the first 30 seconds of a race.

Time (s)	0	5	10	15	20	25	30
Velocity (ft/s)	25	31	35	43	47	46	41

Using a Riemann sum with 6 subintervals and taking the sample points to be left endpoints, approximate the distance the car traveled over 30 seconds. Include units in your final answer.

Riemann sum bottom × Δ top

227 × 5 = 1135 ft/s

6. Write down a definite integral that represents the following limit of a Riemann sum:

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

$\frac{b-a}{n}$ $\frac{b-2}{n} = \frac{3}{n}$

$x_i = a + i\Delta x$

Riemann sum Integrals

False

7. True or false? Explain your answer and include a picture. If $F'(x) = 2x$ and $G'(x) = 2x$, then $F(x) = G(x)$.

$x^2 + C$ $x^2 + C$

C can be any numbe

8. True or False? Please explain your answer: If we estimate the area under a curve using right endpoints, then our approximation will be an overestimate.

9. Find the most general antiderivative.

(a) $\displaystyle\int \frac{e^x}{1+e^x}\,dx$

10. Evaluate the definite integral.

(a) $\displaystyle\int_{-\pi/6}^{\pi/6} \cot(x)\,dx$

(b) $\displaystyle\int_0^{\sqrt{\pi/4}} x\sec^2(x^2)\,dx$

11. Find the first and second derivative of

$$F(x) = \int_x^{-5} \sqrt{1-e^{t^2}}\,dt.$$

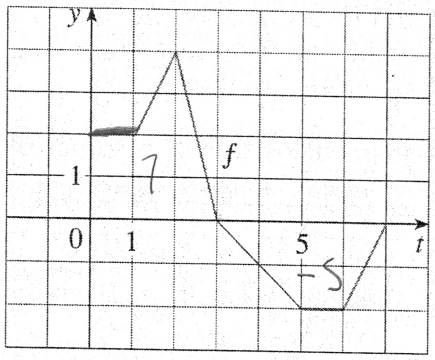
12. Find the derivative of

$$G(x) = \int_{x^3}^{x^4} \arccos(t)\,dt.$$

3. Suppose a bug starts walking along the top of a fence and its velocity is given by the curve below, where t is measured in minutes and $v = f(t)$ is measured in meters per minute.

4+1+2

-1-3-1



(a) At what time is the bug farthest from where it started? How far away from its starting point is the bug at this time?

3 with 7 m

(b) On what interval(s) is the bug heading back towards where it started?

(3, 7)

(c) What is the change in the bug's displacement from minute 1 to minute 5?

5

(d) What is the total distance travelled by the bug over the full 7 minutes?.

7 + 5 = 12

4. True or false? Explain your answer and include a picture.

$$\frac{d}{dx}\left(\int_0^4 \sqrt{t}\,dt\right) = \sqrt{x}$$

Derivate of a constant is zero!