

## Sem 2 Review No Calc

Wednesday, May 20, 2015  
7:08 AM Semester 2 Review

No Calculator

1) Suppose:  $\int_{-2}^2 f(x)dx = 4$ ,  $\int_2^5 f(x)dx = 3$ ,  $\int_{-2}^5 g(x)dx = 2$ . Find the value of  $\int_{-2}^5 (f(x) + g(x))dx$

$$4+3+2 = \boxed{9}$$

2) Evaluate:  $\int_0^1 (8s^3 - 12s^2 + 5)ds = [2s^4 - 4s^3 + 5s]_0^1$   
 $= [2(1)^4 - 4(1)^3 + 5(1)] - 0$   
 $= \boxed{3}$

3) Evaluate:  $\int_1^2 \left( x + \frac{1}{x^2} \right) dx = \left[ \frac{1}{2}x^2 - \frac{1}{x} \right]_1^2 =$   
 $= \left[ \frac{1}{2}(2)^2 - \frac{1}{2} \right] - \left[ \frac{1}{2}(1)^2 - \frac{1}{1} \right]$   
 $= \frac{3}{2} + \frac{1}{2} = \boxed{2}$

4) Evaluate:  $\int_{-1}^1 (2x \sin(1-x^2))dx$  Change!  $= \int_0^{\pi} -\sin u du = \boxed{0}$

$u(1)=0 \quad u=1-x^2$   
 $u(-1)=0 \quad du=-2x dx$

5) Suppose  $F(x)$  is an antiderivative of  $f(x) = \sqrt{1+x^4}$ . Express  $\int_0^1 \sqrt{1+x^4} dx$  in terms of  $F$ .

$$\int_0^1 \sqrt{1+x^4} dx = F(1) - F(0)$$

- 6) An automobile computer gives a digital readout of fuel consumption in gallons per hour. During a trip, a passenger recorded the fuel consumption every 5 minutes for a full hour of travel.

time	gal/hr
0	2.5
5	2.4
10	2.3
15	2.4
20	2.4
25	2.5
30	2.6
35	2.5
40	2.4
45	2.3
50	2.4
55	2.4
60	2.3

*OR Trapezoids!*

Use the Trapezoidal Rule to approximate the total fuel consumption during the hour. Setup but don't evaluate. Give your answer in gallons.

*Should Not be multiplied by  $\frac{1}{60}$  for TOTAL.*

$$A_{\text{TRAP}} = \frac{1}{2} h (b_1 + b_2)$$

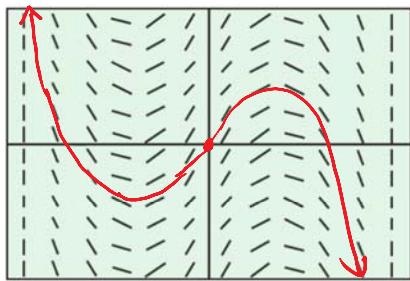
$$A = \frac{5}{2}(2.5+2.4) + \frac{5}{2}(2.4+2.3) + \frac{5}{2}(2.3+2.4) + \frac{5}{2}(2.4+2.4) + \frac{5}{2}(2.4+2.5) + \\ + \frac{5}{2}(2.5+2.6) + \frac{5}{2}(2.6+2.5) + \frac{5}{2}(2.5+2.4) + \frac{5}{2}(2.4+2.3) + \\ + \frac{5}{2}(2.3+2.4) + \frac{5}{2}(2.4+2.4) + \frac{5}{2}(2.4+2.3)$$

7) Evaluate:  $\int (e^{\tan x} \cdot \sec^2 x) dx = \int e^u du = e^u + C$

$u = \tan x$   
 $du = \sec^2 x dx$

$e^{\tan x} + C$

- 8) Draw a possible graph for the function  $y = f(x)$  with slope field given in the figure that satisfies the initial condition  $y(0) = 0$ .



$[-10, 10]$  by  $[-10, 10]$

9) The intensity  $L(x)$  of light  $x$  feet beneath the surface of the ocean satisfies the differential equation  $\frac{dL}{dx} = -kL$

where  $k$  is a constant. As a diver you know from experience that diving to 18 ft in the Caribbean Sea cuts the intensity in half. What is the value of  $k$ ?

$$\text{ExpModel: } y = y_0 e^{-kt} \Rightarrow y = y_0 e^{kx}$$

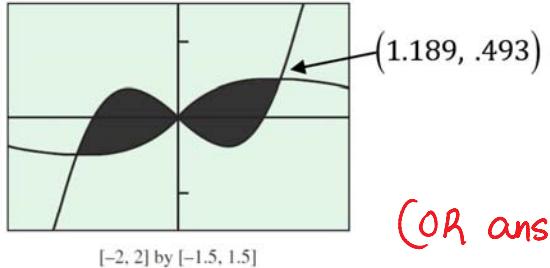
$$\frac{1}{2} = 1 e^{-k(18)}$$

$$\ln \frac{1}{2} = -18k$$

$$k = -\frac{\ln \frac{1}{2}}{18}$$

exponential decay

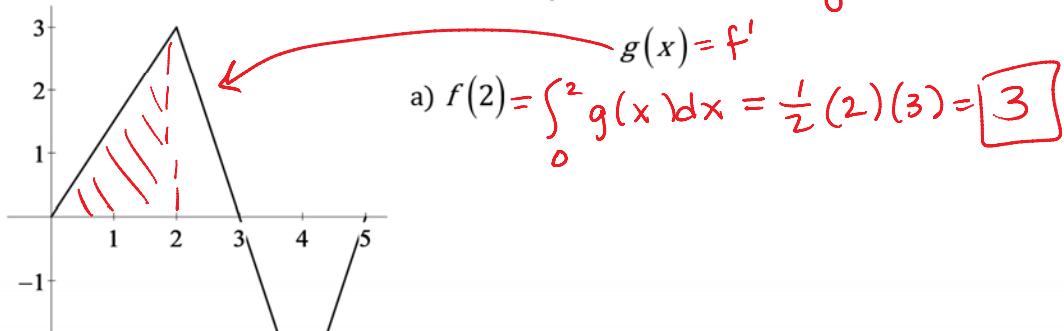
10) Write an integral expression that will find the shaded area between  $y = x^3 - x$  and  $y = \frac{x}{x^2 + 1}$

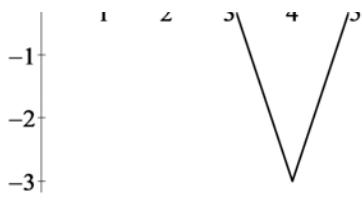


$$\int_{-1.189}^{1.189} \left| (x^3 - x) - \left( \frac{x}{x^2 + 1} \right) \right| dx$$

(OR answer key)

11) Below is a graph of  $g(x)$ . And  $f(x) = \int_0^x g(t)dt$  so  $g'(x) = f'(x)$



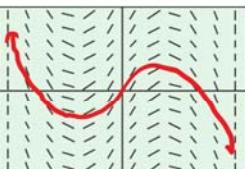


b) Write the equation of the line tangent to  $f(x)$  at  $x=2$ .

point  $f(2)=3$   $(2,3)$  (part a)

slope  $f'(2)=g(2)=3$  (from graph)

$$y - 3 = 3(x - 2)$$

1)	p.316 #9	9
2)	p.316 #19	3
3)	p.316 #26	2
4)	p.316 #28	0
5)	p.316 #47	$F(1) - F(0)$
6)	p.316 #51	$\frac{5}{2}[2.5 + 2(2.4) + 2(2.3) + 2(2.4) + 2(2.4) + 2(2.5) + 2(2.6) + 2(2.5) + 2(2.4) + 2(2.3) + 2(2.4) + 2(2.4) + 2(2.3)] * \frac{1}{60}$
7)	p.373 #7	$e^{\tan x} + c$
8)	p.373 #50	 <p style="text-align: center;">[-10, 10] by [-10, 10]</p>
9)	p.373 #57	$\frac{\ln \frac{1}{2}}{-18} = k$
10)	p.431 #17	$2 \int_0^{1.189} \left( \frac{x}{x^2 + 1} - (x^3 - x) \right) dx$
11)	Made up	a) 3 b) $y - 3 = 3(x - 2)$