Name _____ Period _____ Date _____

Assignment #29C

Group Work: Follow directions given in class… (#1 – no calculators; #2 – Calc OK)

1. Consider the differential equation $\dfrac{dy}{dx} = \dfrac{-xy^2}{2}$. Let $y = f(x)$ be the particular solution to this differential equation with the initial condition $f(-1) = 2$.

   (a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated. **(Note: Use the axes provided in the test booklet.)**
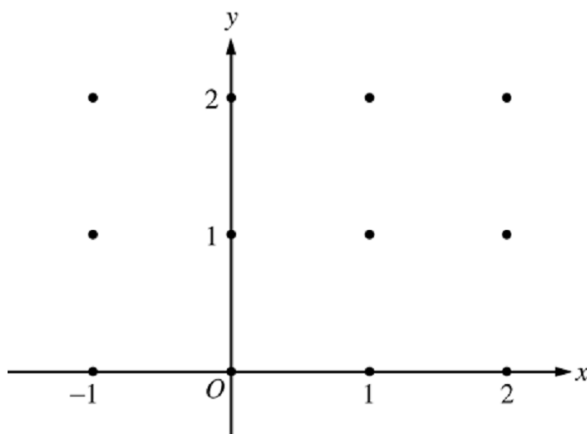
   (b) Write an equation for the line tangent to the graph of f at $x = -1$.

   (c) Find the solution $y = f(x)$ to the given differential equation with the initial condition $f(-1) = 2$.
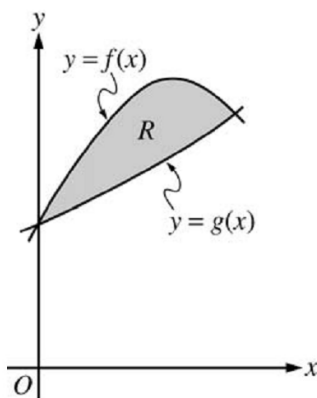
2. Let f and g be the functions given by $f(x) = 1 + \sin(2x)$ and $g(x) = e^{x/2}$. Let R be the shaded region in the first quadrant enclosed by the graphs of f and g as shown in the figure above.

   (a) Find the area of R.

   (b) Find the volume of the solid generated when R is revolved about the x-axis.

   (c) The region R is the base of a solid. For this solid, the cross sections perpendicular to the x-axis are semicircles with diameters extending from $y = f(x)$ to $y = g(x)$. Find the volume of this solid.

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Homework: Please show steps clearly for full credit. No late work accepted!

No Calculators

3. What are all values of x for which the function f defined by $f(x)=(x^2-3)e^{-x}$ is increasing?

(A) There are no such values of x.

(B) $x<-1$ and $x>3$

(C) $-3<x<1$

(D) $-1<x<3$

(E) All values of x

4. If $f(x)=\dfrac{e^{2x}}{2x}$, then $f'(x)=$

(A) 1

(B) $\dfrac{e^{2x}(1-2x)}{2x^2}$

(C) e^{2x}

(D) $\dfrac{e^{2x}(2x+1)}{x^2}$

(E) $\dfrac{e^{2x}(2x-1)}{2x^2}$

5. The average value of $\cos x$ on the interval $\left[-3,5\right]$ is

(A) $\dfrac{\sin 5-\sin 3}{8}$

(B) $\dfrac{\sin 5-\sin 3}{2}$

(C) $\dfrac{\sin 3-\sin 5}{2}$

(D) $\dfrac{\sin 3+\sin 5}{2}$

(E) $\dfrac{\sin 3+\sin 5}{8}$

6. $\displaystyle\int_0^1 \sqrt{x}\,(x+1)\,dx=$

(A) 0   (B) 1   (C) $\dfrac{16}{15}$ (D) $\dfrac{7}{5}$ (E) 2

7. If f is a linear function and $0<a<b$, then $\displaystyle\int_a^b f''(x)\,dx=$

(A) 0   (B) 1   (C) $\dfrac{ab}{2}$ (D) $b-a$ (E) $\dfrac{b^2-a^2}{2}$

8. If $f''(x)=x(x+1)(x-2)^2$, then the graph of f has inflection points when $x=$

(A) -1 only   (B) 2 only   (C) -1 and 0 only   (D) -1 and 2 only   (E) -1, 0, and 2 only

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