AP Calculus Review Unit 6 Extra

1. Find the general solution to $\dfrac{dy}{dx} = 2y\cos x$.

2. Find the particular solution to $e^x e^y y' = 1$ if $y(0) = 1$.

3. The rate of change of a population of bacteria at time t is directly proportional to the population at that time. How long will it take an initial population of 200 to grow to 1500 if the population doubles every 10 hours?

4. The half-life of Sdoutzium is 1200 years. If after 500 years there was 20 grams left how much was there initially?

5. ~~Draw a slope field for $\dfrac{dy}{dx} = 2x - y$ and sketch a possible solution.~~

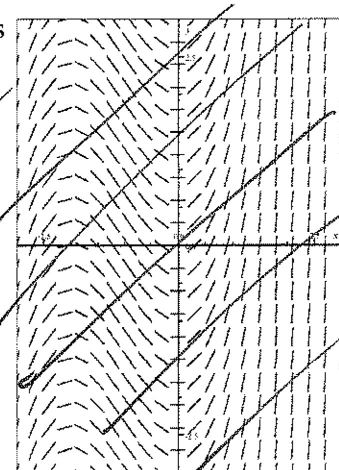
For the slope field shown:

6. Choose a possible solution equation that the field represents

   a) $y = x^2 + 2x$ b) $y = \dfrac{x^3}{3} + x^2 + 3$ c) $y = \sin x$ d) $y = \cos x$

7. Choose the DE that is represented

   a) $y = x^2 + 2x$ b) $y = \dfrac{x^3}{3} + x^2 + 3$ c) $y = \sin x$ d) $y = \cos x$



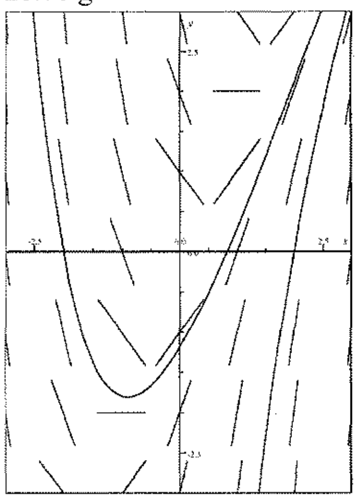
8. Determine the area between $y = 2 - x^2$ and $y = -x$.

9. Determine the area between $y = \sec^2 x$ and $y = \sin x$ from $x = 0$ to $x = \dfrac{\pi}{4}$.

10. Determine the volume of the solid of revolution created by revolving the region bounded by $y = x^2$, $y = 1$, and $x = 2$ about:
    a) the x-axis
    b) the line $y = 1$
    c) the line $y = -1$
    d) the y-axis
    e) the line $x = 2$
    f) the line $x = 3$

11. Determine the volume of a solid with base bounded by the x-axis and one arch of $y = 2\sin x$ and whose cross-sections perpendicular to the x-axis are:
    a) squares
    b) rectangles of height π
    c) semi-circles

KEY

1. $y = Ce^{2\sin x}$
2. $y = \ln(1 + e - e^{-x})$
3. 29.07 hours
4. 26.70 g
5. 
6. b
7. a
8. $\frac{9}{2}$ un^2
9. $\frac{\sqrt{2}}{2}$ un^2
10. a) $\frac{26\pi}{5}$ un^3

    b) $\frac{38\pi}{15}$ un^3

    c) $\frac{118\pi}{15}$ un^3

    d) $\frac{9\pi}{2}$ un^3

    e) $\frac{5\pi}{6}$ un^3

    f) $\frac{7\pi}{2}$ un^3
11. a) 2π un^3

    b) 4π un^3

    c) $\frac{\pi^2}{4}$ un^3