

8. [12 points] For each of the questions below, circle all of the available correct answers. Circle “NONE OF THESE” if none of the available choices are correct. No justification is required. No credit will be awarded for unclear markings.

a. [3 points] The table below gives some values of a function  $g(y)$ .

$y$	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
$g(y)$	1	2	4	6	5	1	2	3	5	4	2	1	3

Suppose  $y = y(x)$  is a function of  $x$ , and consider the differential equation  $y' = g(y)$  with initial condition  $y(1) = 3$ . Then the Euler's Method approximation of  $y(2)$  when the step size is  $\Delta x = 0.5$  is

- i. 3                  ii. 3.5                  iii. 4                  iv. 4.5                  v. 5  
 vi. 5.5                  vii. 6                  viii. 6.5                  ix. 7                  x. 7.5  
 xi. CANNOT BE DETERMINED FROM THE INFORMATION PROVIDED

xii. NONE OF THESE

b. [3 points]  $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{3x}\right)^{4x} =$

- i.  $e^{4/3}$                   ii.  $e^{12}$                   iii.  $\infty$  (DNE)                  iv. 0  
 v. 1                  vi.  $\ln(12)$                   vii.  $\ln(400/9)$                   viii. NONE OF THESE

c. [3 points] Which of the following pairs of parametric equations trace out a curve that lies entirely on the right half of the unit circle centered at the origin?

- i.  $x = \cos^2(t)$  and  $y = \sin^2(t)$  for  $0 < t < \pi/2$   
 ii.  $x = \cos(t)$  and  $y = \sin(t)$  for  $0 < t < 3\pi/4$   
 iii.  $x = \sin(4t)$  and  $y = \cos(4t)$  for  $\pi/2 < t < \pi$   
 iv.  $x = \sqrt{1 - t^2}$  and  $y = t$  for  $-1 < t < 1$   
 v. NONE OF THESE

d. [3 points] Which of the following expressions give the total area inside the polar curve  $r = 2 \sin(\theta)$ ?

- i.  $4\pi$     ii.  $\pi$     iii.  $2 \int_0^\pi \sin^2 \theta \, d\theta$     iv.  $2 \int_0^{2\pi} \sin^2 \theta \, d\theta$     v. NONE OF THESE