3. What is the limit as of the larger of the two roots of the equation where are real numbers and ?

   a)

   b)

   c) –

   d)

   None of the above

4. Find the improper integral:

   a) –

   b)

   c) –

   d) –

   e) None of the above

5. Let — Find —

   a) ——

   b) ——

   c) ———

   d) ———

   e) None of the above

6. Find the minimum value of the function

   a)
   b)
   c)
   d)
   e) None of the above

7. Two half lines begin at the point , creating an angle of . From the point , two particles start moving at the same time, each on a different half line. The first one is moving with the constant speed of sec. The second is moving in such a way that its distance from the point can be expressed by where is measured in meters and in seconds. How fast is the distance between the two particles changing when the first particle is meters from the point

   a) sec
   b)
   c) sec
   d) sec
   e) None of the above

8. Given that

   and that is proportional to determine the constant of proportionality.

   a)
   b)
   c)
   d)
   e) None of the above

e) None of the above

12. Find all values of that satisfy the equation

$$\int_0^a x^2 \quad 4x(\; 4 \; dx \qquad \int_a^4 x^2 \quad 4x(\; 4 \; dx.$$

a) –

b) —

c)

d) –

e) None of the above

13. The graph of —— has

I. a vertical asymptote at .

II. a horizontal asymptote at .

III. an infinite number of zeros.

a) Only I
b) Only II
c) Only III
d) Only II and III
e) None of the above

14. Find the limit:

b)

c)

d)

e) None of the above

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15. Find the derivative of the function .

e) None of the above

16. Find the definite integral:

a)

b)

c)

d)

e) None of the above

17. Given that find .

a)

b)

c)

d)

e) None of the above

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Reminder

Question 20 will be used as a tie-breaker, if necessary.

20. Use properties of the natural logarithm to compute

_____ ____

Leave your answers in terms of *natural logarithm* only.

a)

b)

c)

d)

e) None of the above

21. Assume

d)

e) None of the above

26. For what values of the numbers does the function have the maximum value

a)

b)

c)

d)

e) None of the above

27. Find the definite integral:

a)

b)

c)

d)

e) None of the above

28. The oil in a spherical tank 50 feet in diameter is 20 feet deep. How much oil does the tank contain?

a) $\frac{62500}{3}$

b) $\frac{31250}{3}$

c) $\frac{22000}{3}$

d) $\frac{78125}{24}$

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e) None of the above

29. Find the definite integral:

a)

b)

c)

d) −

e) None of the above

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d) –

e) None of the above

35. How many inflection points does the curve given by the equation have?

a) No inflection points
b) Exactly one inflection point
c) Exactly two inflection points
d) Exactly three inflection points
e) None of the above

36. Suppose for any real number How large can possible be?

a)
b)
c)
d)
e) None of the above

37. The line tangent to the graph of the function at the point with the *x*-coordinate crosses the -axis at the point with the -coordinate.

a) –

b) –

c) –

d) –

e) None of the above

38. Given that _____, find the definite integral:

a) —

b) —

c) – –

d) – –

e) None of the above

39. Find the area of the region cut off from the parabola by the chord joining the points .

a) —

b) —

c)

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b)

c)

d)

None of the above