

Math 232
Review Worksheet
Fall 2009

Work out each problem. When you finish, find the answer listed on the back page and its corresponding letter. Fill in that letter for each space where you find the question number. Question number 0 is done as an example.

0. Find the derivative. $f(x) = 2.7x$

Answer: $f'(x) = \underline{2.7}$

1. Evaluate $\int_0^\pi t \cos(5t) dt$

Answer: _____

2. Evaluate $\int_1^5 \frac{x-1}{x(x+1)^2} dx$

Answer: _____

3. Evaluate $\int_0^3 \frac{x^3}{\sqrt{x^2+9}} dx$

Answer: _____

4. Evaluate $\int_0^\infty x e^{-5x} dx$

Answer: _____

5. Find the area bounded by the curves $f(x) = (x-1)^3$ and $g(x) = x-1$

Answer: _____ *units*²

6. Find the volume when the region bounded by $y = \sqrt{x}$, $y = 0$, and $x = 4$ is revolved around the line $x = 6$.

Answer: _____ *units*³

7. Find the volume when the region bounded by $y = 2x - x^2$ and $y = 0$ is revolved around the x -axis.

Answer: _____ *units*³

8. Find the volume of the solid whose base is bounded by $x^2 + y^2 = 4$ and whose cross-sections perpendicular to the x -axis are squares.

Answer: = _____ *units*³

9. Find the arc length of the graph of $y = \frac{1}{6}x^3 + \frac{1}{2x}$ on $[\frac{1}{2}, 2]$.

Answer: _____ *units*

10. A 100-lb chain is 50 feet long and hangs vertically from the top of a 200-ft tall building with a 150-lb weight on the end. How much work is required to raise the weight to a height of 170 ft above the ground?

Answer: _____ *ft - lbs*

11. A swimming pool filled with water is in the shape of an inverted right circular cone. It has diameter of 16 feet and height of 5 feet. How much work is needed to pump out water over the side of the pool until only a 1 foot depth of water is left? Note: Water weighs 62.5 lbs/ft³.

Answer: _____ ~~ft - lbs~~ ^{ft · lbs}

12. Solve the initial-value problem $e^{-y}y' + \cos x = 0$ when $y(\frac{-\pi}{6}) = 0$. What is the absolute value of the constant of integration C?

Answer: $|C| =$ _____

13. At 5 pm a pot of water is taken off the stove with temperature of 55 degrees Celsius. It is placed outside where the temperature is 30 degrees. At 7 pm, the water has a temperature of 50 degrees. Using Newton's Law of Cooling, find an expression for the temperature T of the water at time t hours, where $t = 0$ represents 5 pm. Your answer will be the value of k in your equation.

Answer: $k =$ _____

14. A bacteria culture grows exponentially. It has initial population of 160 and after two hours has grown to a population of 810. Write an equation to represent the population at any time t . Then calculate how many minutes it took for the population to reach 240.

Answer: _____ *minutes*

15. Find the limit of the sequence $a_n = \frac{2^{n+1} + \cos^2 n}{2^n}$

Answer: _____

16. Determine if the series $\sum_{n=1}^{\infty} \frac{1-3^n}{5^n}$ converges or diverges. If the series diverges let your answer be 100. If it converges, let your answer be the sum of the series.

Answer: _____

17. Determine if the series $\sum_{n=1}^{\infty} \frac{n^2-3}{n^3+1}$ converges or diverges. If the series diverges let your answer be 200. If it converges, let your answer be 300.

Answer: _____

18. Determine if the series $\sum_{n=4}^{\infty} \frac{1}{n} - \frac{1}{n+3}$ converges or diverges. If the series diverges let your answer be 400. If it converges, let your answer be the sum of the series.

Answer: _____

19. Determine if the series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} \ln n}{n}$ is absolutely convergent (answer = 500), conditionally convergent (answer = 600), or divergent (answer = 700).

Answer: _____

20. Determine if the series $\sum_{n=2}^{\infty} \frac{\sqrt{n^2-2}}{n(3^n)}$ is convergent (answer = 800) or divergent (answer = 900).

Answer: _____

21. Find the interval of convergence of the power series $\sum_{n=1}^{\infty} \frac{(x-4)^n}{n(5^n)}$. One endpoint is included in the interval and the other is not. The answer is the endpoint which is included.

Answer: _____

22. Find the radius of convergence of the power series $\sum_{n=0}^{\infty} \frac{n!(x+2)^n}{5^n}$

Answer: $R =$ _____

23. Starting with the geometric series, find the power series representation for $\ln(1-x)$. Use this to find the value of the power series $\sum_{n=1}^{\infty} \frac{1}{(3^n)n}$.

Answer: _____

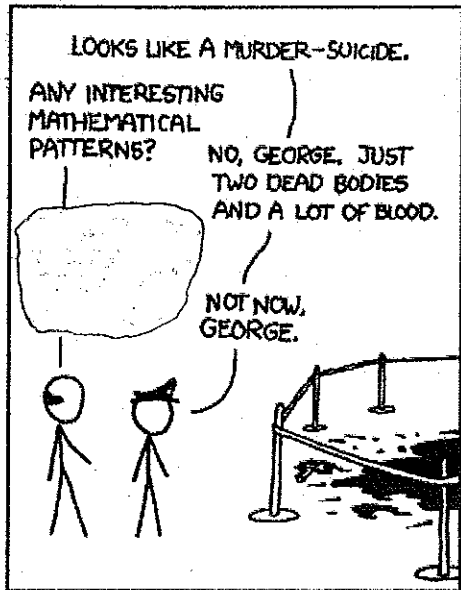
24. Use Maclaurin series to evaluate $\lim_{x \rightarrow 0} \frac{x^3}{1 + x + \frac{x^2}{2} - e^x}$

Answer: _____

25. Express $x^2 \cos 2x$ as a power series centered at zero. What is the coefficient of the x^8 term?

Answer: _____

xkcd #587



WHEN MATHNET SHUT DOWN, THE OFFICERS HAD TROUBLE REINTEGRATING INTO THE REGULAR L.A.P.D.

Answer	Letter	Answer	Letter
2.7	T	100	A
11	B	-5/4	F
-6	E	43	C
128/3	H	1/25	H
-2/25	W	300	A
$\ln(2/\sqrt{5})$	O	600	I
4600	S	800	N
500	P	700	T
-7	S	2	D
0	M	30	N
$192\pi/5$	S	-4/45	R
200	I	5	N
900	T	33/16	E
-1	U	$\ln(3/5)+2/3$	O
1/2	A	37/60	B
$25000\pi/3$	E	$18-9\sqrt{2}$	T
400	R	$16\pi/15$	T
3/2	C	$\ln(3/2)$	B

When you fill in the appropriate letters, you will have what the mathnet officer is saying.

0 1 2 3 4 5 6 7 8 9

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

20 21 22 23 24 25