Calc 1 Worksheet #41
Approximating Areas using Reimann Sums

1	Approximate the area under $y = (x-1)^2$ on [0,4] using (a) 4 rectangles whose height is given using the left endpoint (b) 4 rectangles whose height is given using the right endpoint (c) 4 rectangles whose height is given using the midpoint (d) 4 trapezoids. (e) Evaluate the integral directly.
2	Approximate the area under $y = x^2 - 1$ on [0,4] using (a) 4 rectangles whose height is given using the left endpoint (b) 4 rectangles whose height is given using the right endpoint (c) 4 rectangles whose height is given using the midpoint (d) 4 trapezoids (e) (e) Evaluate the integral directly.
3	Approximate to 3 decimal places the integral $\int_0^4 \sqrt{x}$ with 4 equal intervals using: a) rectangles whose height is the right-hand endpoint b) rectangles whose height is the left-hand endpoint c) rectangles whose height is the midpoint of the interval d) trapezoids (trapezoidal rule) e) Evaluate the integral directly.
4	Approximate the area under $y = (x + 1)^2$ on [0, 4] using (a) 4 rectangles whose height is given using the left endpoint, (b) 4 rectangles whose height is given using the right endpoint, (c) 4 rectangles whose height is given using the midpoint, and (d) 4 trapezoids. (e) Evaluate the integral directly.
5	If a chart of values for f(x) =

x	-3	0	3	6	9	12	15
F(x)	-1	0	1	3	1	0	-1

Find a trapezoidal approximation of $\int_{-3}^{15} f(t)dt$ using six subintervals of length $\Delta t = 3$

6	If $3x^2 + 2xy + y^2 = 2$, then the value of $\frac{dy}{dx}$ at x = 1 is
7	If $f(x) = \begin{cases} 2x & \text{for } x \le 1 \\ 3x^2 - 1 & \text{for } x > 1 \end{cases}$ then find $\int_0^2 f(x)dx$.
8	If $V = \frac{4}{3}\pi r^3$, what is $\frac{dV}{dr}$ when r = 3?
9	If $f(x) = x \cos\frac{1}{x}$, then $f'\left(\frac{2}{\pi}\right) =$
10	$\lim_{x \to 4} \frac{x^3 - 4x^2 - x + 4}{x - 4}$
11	The solution set of $\frac{7}{x^2 + 8x + 23} = 1$ is
12	Why does $f(x) = \frac{x^2 - 4x}{x - 2}$ on [0,4] **not** satisfy the hypotheses of Rolle's Theorem?

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13	Find c for the Mean Value Theorem if $f(x) = 2x^2 + 1$ in [1,3].
14	A function f that is continuous for all real numbers x has $f(3) = -1$ and $f(7) = 1$. If $f(x) = 0$ for exactly one value of x, then which of the following could be x? A) –1 B) 0 C) 1 D) 4 E) 9

Answers:

1 a) 6 b) 14 c) 9 d) 10 e) 28/3	2 a) 12 b) 26 c) 37/2 d) 19 e) 56/3	3 a) 6.146 b 4.146 c) 5.384 d) 5.146 e) 5.333	4 a) 30 b) 54 c) 41 d) 42 e) $\frac{124}{3}$	5 12
6 Not defined	7 7	8 36π	9 $\frac{\pi}{2}$	10 15
11 $\{-4,-4\}$	12 f(2) DNE, therefore not continuous and f '(2) is undefined	13 2	14 4	