

CALCULUS I - Worksheet #21

1. Find c for Rolle's Theorem for $f(x) = x^3 - 4x$ on $[-2, 2]$.
2. Find c for the Mean Value Theorem for $f(x) = \frac{x-1}{x}$ on $[1, 3]$.
3. Find c for Rolle's Theorem for $f(x) = 3x^2 - 12x$ on $[0, 4]$.
4. Find c for the Mean Value Theorem for $f(x) = x^3 + 1$ on $[-2, 4]$.
5. Why does $f(x) = \sqrt{x+1}$ not hold true for the Mean Value Theorem on $[-2, 2]$?
6. $f(x) = \frac{x^2 - 1}{x-1}$ when x is not 1 and $f(x) = 1$ when $x = 1$.
 - a) Is f continuous at $x = 1$?
 - b) Is f continuous at $x = 0$?
 - c) Is f continuous at $x = -1$?
7. $f(x) = \frac{x^2 - 16}{x - 4}$ when x is not 4 and $f(4) = k$. Find k so that f is continuous at $x = 4$.

8-10 Solve the following using variables separable:

8. If $\frac{dy}{dx} = x^2 - 2$ and $y = -3$ when $x = 1$, then find y .
9. $\frac{dy}{dx} = x^2 \sqrt{y}$
10. $\frac{dy}{dx} = \frac{x+1}{y-1}$
11. $\int \cos^3 4x \, dx$
12. $\int \cos^2 4x \, dx$
13. $\int_1^2 2^x \, dx$