

Math 408C Prac. Test 2

1. Two sides of a triangle have lengths 5 and 7, respectively. The angle θ between them is increasing at the rate of $1/2$ radian per second. How fast is the length of the other side changing when θ is $\pi/6$? (*Hint: Law of cosines.*)

2. Use a linear approximation to estimate $\sqrt[3]{29}$.

3. Sketch a graph of $y = \frac{x^2}{x^2 + 1}$. Show everything.

4. Find $\lim_{x \rightarrow -\infty} (x + \sqrt{x^2 + 2x})$.

5. Sketch a good graph of $y = x^2(2x^2 - 9)$, showing all critical points and inflection points. Find the intervals where the curve is increasing, decreasing, concave up and concave down.

6. Sketch a good graph of $y = \frac{x^2 - x + 1}{x}$, showing all critical points and inflection points. Find the intervals where the curve is increasing, decreasing, concave up and concave down.

7. Find dy/dx if $\frac{x}{y} = \tan(x^2 + y^2)$

8. Find $\lim_{x \rightarrow 0} \frac{\tan 2x}{\sin 3x}$.

9. Find the absolute minimum and absolute maximum values of $f(x) = 2x^3 - 3x^2 - 12x + 1$ on the interval $[-2, 3]$.

10. Find all the critical points of $f(x) = x^{1/3} - x^{-2/3}$.