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Math_Questions_0022

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1) Graph the function f(x) = 8/(x^2+4)
Show all work. State the domain, calculate the limit as x-> +/- infinity, clearly state all relative max/min pts and any inflection pts, indicate intervals upon which f is increasing/decreasing, concave up/down. Sketch.

2) a) Explain what it means to say that g(x) is continuous at x.

b) Explain what it means to say that g(x) is differentiable at **x = a**.

c) Let g(x) ={ax^2 + b for x < = 1
{2x^3 for x > 1
Determine the values of a and b so that g is differentiable (and hence continuous)

3) A drilling rig 12 miles offshore is to be connected by a pipe to a refinery onshore, 20 miles down the coast from the rig. If underwater pipe costs $50,000 per mile and land-based pipe costs $30,000 per mile, what values of x and y give the least expensive connection?

4) Coffee is draining from a conical filter into a cylindrical coffeepot at the rate of 10 cubic inches/minute. How fast is the level in the pot rising when the coffee in the cone is 5 inches deep? How fast is the level in the cone falling then? [Recall: volume of a cylinder = pi r^2 h and volume of a cone = pi/3 r^2 h] Hint: use proportional/similar triangles.
Diagram shows that the cylinder and cone both have diameter 6 inches, and the cone has height 6 inches

5) The annual world rate of water use t years after 1960, for t <=35, was approximately 860 e ^ 0.04 t cubic kilometers per year. How much water was used between 1960 and 1995?