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PART III: Questions 21 – 30, Self select

Choose FIVE out of the next TEN questions to complete. You must show all your work and clearly indicate your answer for full credit. CROSS OUT the problems that you do not want graded.

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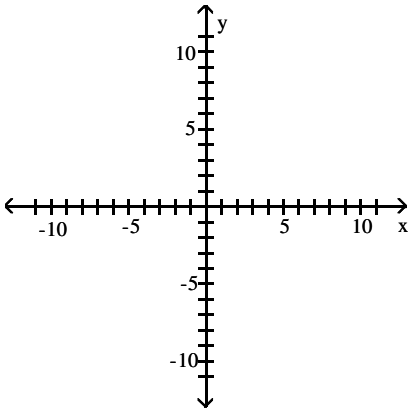
Write the partial fraction decomposition of the rational expression.

21) $\dfrac{8x + 1}{(x - 1)(x^2 + x + 1)}$

Write an equation for the ellipse satisfying the given conditions. Graph the ellipse.

22) Foci at (−2, 1) and (4, 1); length of major axis is 10



Solve the problem.

23) What principal invested at 8% compounded continuously for 4 years will yield $1190? Round the answer to two decimal places.

Solve the problem.

24) A right triangle has one vertex on the graph of $y = x^2$ at (x, y), another at the origin, and the third on the (positive) y–axis at (0, y). Express the area A of the triangle as a function of x.

Solve the equation. Give BOTH the <u>exact solution</u> and the <u>approximate solution</u> to the nearest hundredth.

25) $4^{(3x - 1)} = 19$

Find the value of the determinant without using your calculator, showing all of your steps.

26)
$$\begin{vmatrix} 3 & 5 & 1 \\ -2 & 0 & 2 \\ 4 & -1 & 3 \end{vmatrix}$$

Find the composite function $(f \circ g)(x)$, and state its domain.

27) $f(x) = \dfrac{6}{x - 8}$; $g(x) = \dfrac{-72}{x}$

Solve the problem.

28) The logistic growth model $P(t) = \dfrac{940}{1 + 19.89e^{-0.337t}}$ represents the population of a bacterium in a culture tube after t hours. When will the amount of bacteria be 740? Round your answer to the nearest hundredth of an hour.

29) A brick staircase has a total of 18 steps The bottom step requires 116 bricks. Each successive step requires 5 less bricks than the prior one. How many bricks are required to build the staircase?

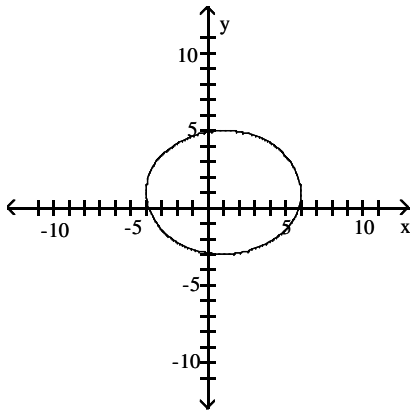
Form a polynomial f(x) with real coefficients having the given degree and zeros.

30) Degree: 3; zeros: –2 and 3 + i.

Answer Key
Testname: CA-FINALASS

21) $\frac{3}{x-1} + \frac{-3x+2}{x^2+x+1}$

22)



$\frac{(x-1)^2}{25} + \frac{(y-1)^2}{16} = 1$

23) $864.12

24) $A(x) = \frac{1}{2}x^3$

25) $x = \frac{\ln 19 + \ln 4}{3 \ln 4} = \frac{\ln 76}{\ln 4^3}$ or approximately 1.04

26) 78

27) $f \circ g = -\frac{6x}{8x+72} = -\frac{3x}{4x+36}$; domain: $\{x \mid x \neq 0, x \neq -9\}$

28) 12.76 hours

29) 1323 bricks

30) $f(x) = x^3 - 4x^2 - 2x + 20$