**SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER.  Circle answers.**
**TURN IN <u>ALL</u> WORKSHEETS.  CALCULATORS ARE REQUIRED ON THIS TEST.**

1.  **Factor completely**

    a)   $8x^3 - 27y^3$
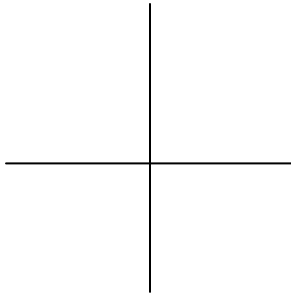
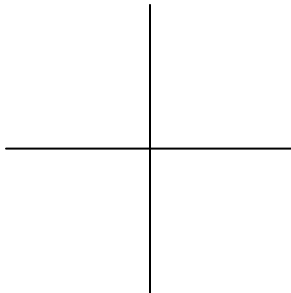    b)  $(x^2 - 5x)^2 + 10(x^2 - 5x) + 24$

2.  **Express as a single fraction:**

    $$\frac{x}{x^2+6x+9} - \frac{3}{x^2-9}$$

3.  **Find all roots and graph:**

    a)    $y = x^3 + 12x^2$

    b)    $y = x^4 - 12x^3$

4.  **Use your <u>calculator</u> :**

    | (Fractional form) | (Decimal approx) |
    |---|---|
    | a)   $32^{-\frac{4}{5}}$ | b)  $\sqrt[5]{3} + \sqrt[3]{5}$ |

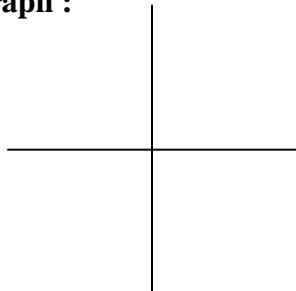    | (Decimal approx) | (Fractional form) |
    |---|---|
    | c) $\dfrac{\sqrt{2}-14\sqrt{3}}{2\sqrt{3}-3\sqrt{2}}$ | d) $\dfrac{3+5i}{7-6i}$ |

5.  **Find the equation of the perpendicular bisector of the line segment between (–6, 3) and (2, –7).**
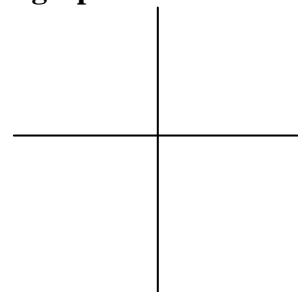    **(Give answer in  y = mx + b form.)**

**6.**   **Find the vertex and graph :**

$x = -y^2 + 6y - 2$

**7.**   **Find the center, radius, and graph :**

$x^2 + y^2 - 4x + 10y - 7 = 0$

**8.**   **Use your calculator to find all roots.  Verify by synthetic division.**
     **Give irrational roots in radical form:**

$x^4 - 12x^3 + 37x^2 - 50 = 0$

**9.**   $f(x) = \dfrac{x-3}{5x}$ and $g(x) = x^2 - 4x$

**a)**  f [ g(x) ]  =

**b)**  g [ f(x) ]  =

**10.  Solve.**

     **Sketch graph (give all roots!).**

**a)**     $|x - 8| > 5$   (Give interval notation!)

**b)**    $(x - 4)^4 (x + 2)^2 (x - 5) = 0$

**11a)   $\log_6 100 =$** _____          **b)   ln 0 =** _____

**c)   $\log_b \sqrt{b} =$** _____          **d)   ln e$^{10x}$ =** _____

**12.   Solve for $x$   (use logarithms!):    $8^{(3x-2)} = 5^x$**

**13.   A population grows from 3,500 in 1998 to 6,500 in 2002.   If $y = y_0\, e^{k t}$,**

   **find "k" and estimate the population in 2008.**

   **When will the population reach 20,000?**