DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE

Review for Midterm 1. Prof. Luis Fernandez.

1. Sketch the graphs of the following linear equations:

   (a) $2x - 3y = 6$ (b) $x + 4y = 8$ (c) $y = -\dfrac{1}{2}x + 4$ (d) $y = 2x - 3$

2. Find the slope of the lines described by the following information:

   (a) With equation $y = \dfrac{2}{3}x + 4$

   (b) With equation $2x - 3y = 8$

   (c) Passing through the points $(4, -2)$ and $(5, 1)$

   (d) Perpendicular to the line with equation $x - 4y = 1$

3. Write an equation of the line described by the following information:

   (a) With slope $-\frac{1}{2}$ and passing through the point $(3, -2)$

   (b) Passing through the points $(2, -1)$ and $(-4, -3)$

   (c) perpendicular to the line with equation $y = 3x - 4$ and passing through $(1, 9)$.

   (d) Parallel to the line with equation $3x - 5y = 4$ and having the same y–intercept as the line with equation $x - 4y - 8 = 0$.

4. For each of the the following quadratic functions $f(x)$:

   A. $f(x) = (x - 2)^2 - 1$ B. $f(x) = x^2 + 2x - 3$ C. $f(x) = -3x^2 - 6x - 4$

   (a) Find the vertex.

   (b) State the domain of f.

   (c) State the range of f.

   (d) Find the x-intercept(s).

   (e) Find the y-intercept(s).

   (f) Sketch the graph of $y = f(x)$.

5. The graph of a parabola $y = f(x)$ has axis of symmetry $x = -1$, vertex $(-1, 5)$, and $f(0) = 3$.

   (a) Write the equation of the parabola in standard form.

   (b) State the domain and the range of f.

   (c) Sketch a graph of $y = f(x)$.

6. For each of the the following polynomials $p(x)$:

   A. $p(x) = x^3 - 3x^2 + 4$ B. $p(x) = -x^3 + 4x^2 - x - 6$ C. $p(x) = 2x^4 + 7x^3 + 6x^2 - x - 2$

   (a) List all possible rational roots of $p(x)$, according to the Rational Zeros Theorem.

   (b) Factor $p(x)$ completely.

   (c) Find all roots of the equation $p(x) = 0$.

   (d) Determine the end behavior of the graph of $y = p(x)$.

   (e) Determine the y–intercept of the graph of $y = p(x)$

(f) Determine the x–intercepts of the graph $y = p(x)$

(g) Determine the local behavior of $y = p(x)$ near the x-intercepts.

(h) Use the above information to sketch a graph of $y = p(x)$.

7. (a) State carefully the remainder theorem.

(b) Find the remainder of the division of $x^{122} - 20x^{51} + 60x^{34} + 1$ when divided by $x - 1$.

(c) State carefully the factor theorem.

(d) Find a polynomial of degree 4 with zeros at $x = 2$ and $x = 1$.