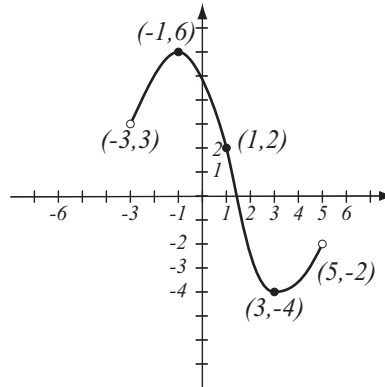**1.** (8pts) Use the graph of the function f at right to answer the following questions.

a) Find: $f(3) =$ \qquad $f(-3) =$

b) What is the domain of f?

c) What is the range of f?

d) What are the solutions
of the equation $f(x) = -3$?

(graph with labeled points: (-1,6), (-3,3), (1,2), (5,-2), (3,-4))

2. (10pts) Use your calculator to accurately sketch the graph of $y = x^4 - 5x^2 - 10$.

a) Draw the graph on paper and indicate units on the axes.

b) Find all the $x-$ and $y-$intercepts (accuracy: 6 decimal points).

3. (5pts) Write the equation of the line that passes through points $(2, -3)$ and $(-4, 9)$.

4. (10pts) Find the equation of the line (in form $y = mx + b$) that is parallel to the line $3x - 2y = 8$ and has x-intercept 5. Draw both lines.

5. (7pts) Draw the triangle with vertices $A = (-3, 4)$, $B = (2, -1)$, $C = (3, 2)$. Use either slopes or lengths of sides (distance formula) to determine whether the triangle is a right triangle.

6. (9pts) Let $f(x) = \dfrac{\sqrt{2x - 7}}{x^2 - 3x + 2}$. Find the following (simplify where appropriate).

$f(8) =$

$f(2) =$

$f(-2x) =$

$f(u - 3) =$

7. (9pts) Find the domains of the functions below and write them using interval notation.

$f(x) = \dfrac{3x - 1}{x^2 + 4x - 5}$

$g(x) = \sqrt{16 - 6x}$

8. (6pts) Solve and write the solution in interval notation.

$3x + 1 < 4$ or $2x - 5 > 9$

9. (10pts) The endpoints of a diameter of a circle are $(-1, 5)$ and $(3, -1)$.
a) Find the equation of the circle.
b) Draw the circle in the coordinate plane.

10. (12pts) Zoe is considering which taxi company to use for a trip:
Ridewith charges a $4.00 for any ride up to one mile plus $1.75 per mile for miles past one.
Tripbuddy charges $2.25 per mile.
If Zoe rides more than one mile, for which number of miles traveled is Tripbuddy the better option? Solve as an inequality.

11. (14pts) Shepherd Billy looked away from his cow just when it started trotting away at 4 meters per second. Having realized what is happening 12 seconds later, he starts to chase the cow, running at 7 meters per second.
a) How long does Billy run until he catches up with the cow?
b) How far does he run until that moment?

Bonus (10pts) A university invests 1,400,000 at simple interest, part at 5%, half that amount at 3.5% and the rest at 5.5%. What is the most that the university can invest at 3.5% and still have at least $68,000 in interest per year? Solve as an inequality.