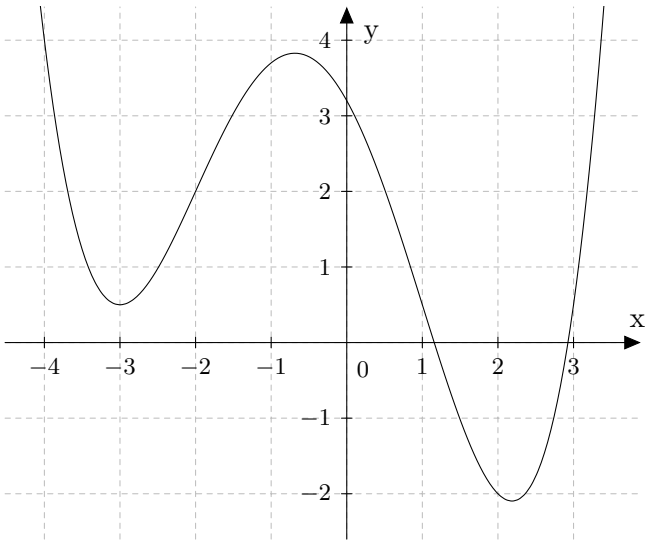
Math 40 Exam 5 Solutions

1. (24 points) Evaluate each function at the given values. Simplify, but don't approximate.
   (a) For $Q(t) = \sqrt{1+4(t-1)^2}$, Evaluate $Q(0)$ and $Q(1)$.
   Solution: $Q(0) = \sqrt{1+4(0-1)^2} = \sqrt{1+4} = \sqrt{5}$
   $Q(1) = \sqrt{1+4(1-1)^2} = \sqrt{1} = 1$
   (b) For $R(x) = \sqrt[3]{3(x-3)(x+3)}$, Evaluate $R(3)$ and $R(6)$.
   Solution: $R(3) = \sqrt[3]{3(3-3)(3+3)} = \sqrt[3]{0} = 0$
   $R(6) = \sqrt[3]{3(6-3)(6+3)} = \sqrt[3]{3^4} = 3\sqrt[3]{3}$
   (c) For $A(y) = |y^2 - y - 2|$, Evaluate $A(0)$ and $A(2)$.
   Solution: $A(0) = |0^2 - 0 - 2| = |-2| = 2$, $A(2) = |2^2 - 2 - 2| = |0| = 0$,
   (d) For $F(a) = \dfrac{a-4}{2a+4}$, Evaluate $F(-2.1)$ and $F(-1.9)$. **Solution:** $F(-2.1) = \dfrac{-2.1-4}{2(-2.1)+4} = \dfrac{-6.1}{-0.2} = 30.5$, $F(-1.9) = \dfrac{-1.9-4}{2(-1.9)+4} = \dfrac{-5.9}{0.2} = -29.5$

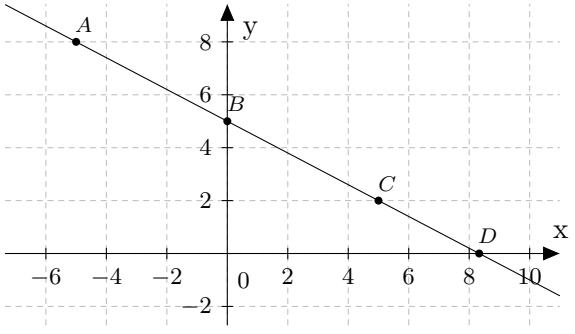
2. (25 points) Use the graph of $y = f(x)$ shown at right to answer the questions. In each, approximate to the nearest tenth.



   (a) Find $f(-2)$ and $f(2)$
   Solution: $f(-2) \approx 2$ and $f(2) \approx -2$
   (b) For what value(s) of x is $f(x) = 2$?
   Solution: $f(-3.7) \approx 2$, $f(-2) \approx 2$, $f(0.5) \approx 2$ and $f(3.2) \approx 2$
   (c) Find the x and y-intercepts of the graph.
   Solution: $(0, 3.2)$ is the y-intercept and $(1.2, 0), (2.9, 0)$ are the x-intercepts.
   (d) What is the minimum value of $f(x)$? For what value(s) of x does f take on this minimum value?
   Solution: The min is $f(2.2) \approx -2.1$
   (e) Over what interval(s) is $f(x) < 2$? Write the intervals using interval notation.
   Solution: Inspecting the graph we see that $f(x) < 2$ if $x \in (-3.6, -2) \cup (0.5, 3.2)$

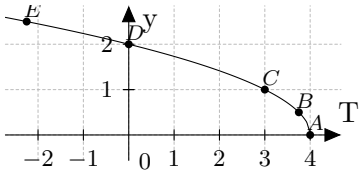
3. (24 points) For each function, create a table of values showing at least 4 points (find significant points for the graph) and use these to construct a careful graph of the function. Remember to scale and label the axes.
   (a) $g(t) = 5 - \dfrac{3}{5}t$

x	-5	0	5	$\frac{25}{3}$
y	8	5	2	0



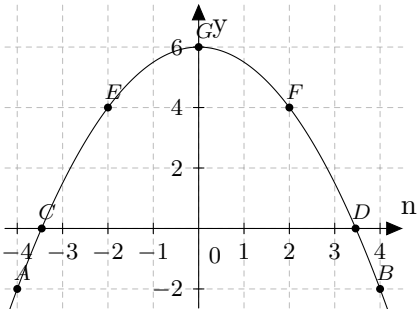
(b) $L(T) = \sqrt{4 - T}$

T	4	$\frac{15}{4}$	3	0	-2.25
$L(T)$	0	$\frac{1}{2}$	1	2	2.5



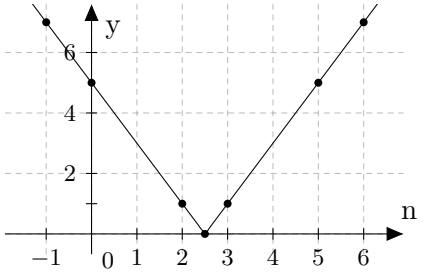
(c) $p(n) = 6 - \frac{1}{2}n^2$

n	± 4	$\pm 2\sqrt{3}$	± 3	± 2	0
$p(n)$	-2	0	1.5	4	6



(d) $A(x) = |2x - 5|$

T	-1	0	2	2.5	3	5	6
$L(T)$	7	5	1	0	1	5	7



4. (27 points) In each table, y varies directly or inversely with a power of x. Find the power of x and the constant of variation, k. Then write a formula for the function of the form $y = kx^n$ or $y = \frac{k}{x^n}$.

(a)

x	4	8	16
y	1.25	2.5	5

Solution: $y = \frac{5}{4}x$

(b)

x	2	5	8
y	8	50	128

Solution: $y = 2x^2$

(c)

x	2	5	10
y	125	8	1

Solution: $y = \dfrac{1000}{x^3}$