Worksheet 3

MATH 006B - Schmidt

Winter 2021

Instructions:

- **Show ALL your work to receive credit!** Cross off anything you do not wish to be graded.
- Simplify your answers as much as possible. For instance, evaluate 2^2, but not $\sqrt{2}$.
- **Work with your group** on the following exercises. Each of you will turn in your own work via Gradescope.
- **Your group** may ask the TA questions, which the TA will answer with leading questions (not answers) to help guide you to the answer.

1. (9 points) Let $f(x) = x^2$ and $g(x) = -(x-1)^2 + 4$.

   (a) (1 point) Write $g(x)$ in terms of $f(x)$.

   $$f(x) = (-(x-1)^2 + 4)^2$$

   (b) (2 points) Verbally describe how to obtain the graph of g from the graph of f.

   move up by 4 → $f(x) = x^2 + 4$ $f(x) = -(x-1)^2 + 4 = g(x) = -(x-1)^2 + 4$
   move left by 1 → $f(x) = (x+1)^2 + 4$
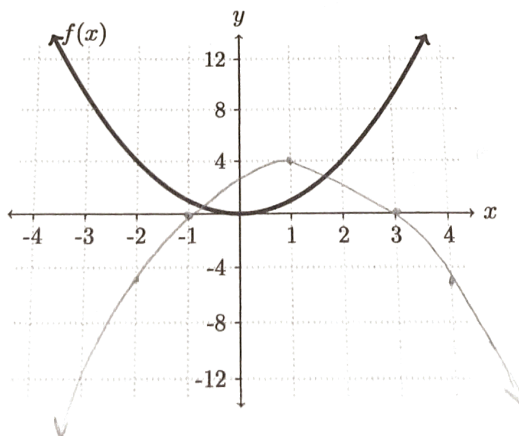   flip parabola → $f(x) = -(x+1)^2 + 4$

   (c) (2 points) What are the roots of $g(x)$? Show your work.

   $(-1, 0)$ & $(3, 0)$ $-(x-1)(x-1) + 4$ $-x^2 + 2x + 3$
                                  $(-x+1)(x-1) + 4$
                                  $-x^2 + x + x - 1 + 4$

   (d) (2 points) f is graphed below. Sketch the graph of g on similar axes, making sure to clearly mark and label its vertex and roots.

   (e) (2 points) What are the domain and range of $g(x)$? Give your answers in interval notation.

   The domain and range of $g(x)$ is: domain: $(-\infty, \infty)$
                                                range: $(-\infty, 4]$

2. (5 points) The quadratic function $p(x)$ is graphed below. Write a function formula for $p(x)$ in...

(a) (3 points) ...factored form. Show your work.

(b) (1 point) ...vertex form.

(c) (1 point) ...standard form.

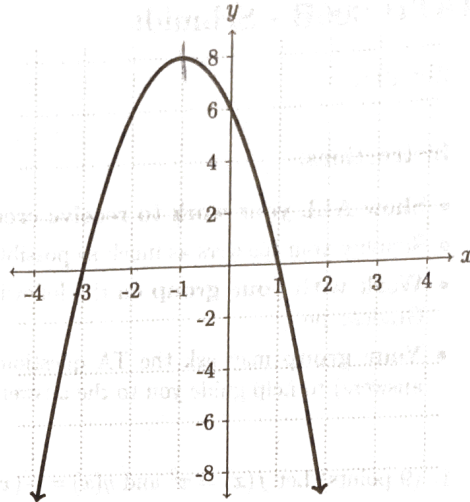a) roots are $x = -3$, $x = 1$

$P(x) = a(x - (-3))(x-1)$

$P(-1) = 8$

$8 = P(-1) = a(-1+3)(-1-1)$

$8 = a(2)(-2)$

$8 = -4a$

$a = \dfrac{8}{-4} = -2$

$P(x) = -2(x+3)(x-1)$

3. (1 point) Participation – no submission

2b. $P(x) = -2(x+3)(x-1)$

roots are $x = -3$, $x = 1$

$P(x) = -2x^2 - 4x + 6$

x-cordinate: $a = -2$, $b = -4$

$\hookrightarrow \dfrac{-b}{2a} = \dfrac{-4}{2(-2)} = \dfrac{4}{-4} = -1$

V-cordinate: $P(1) = -2(-1)^2 - 4(-1) + 6$

$-2 + 4 + 6 = 0$

$10 - 2 = 8$

vertex: $(-1, 8)$

$P(x) = -2(x+1)^2 + 8$

2c. $P(x) = -2(x+3)(x-1)$

$(-2x-6)(x-1)$

$-2x^2 + 2x - 6x + 6$

$P(x) = -2x^2 - 4x + 6$

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