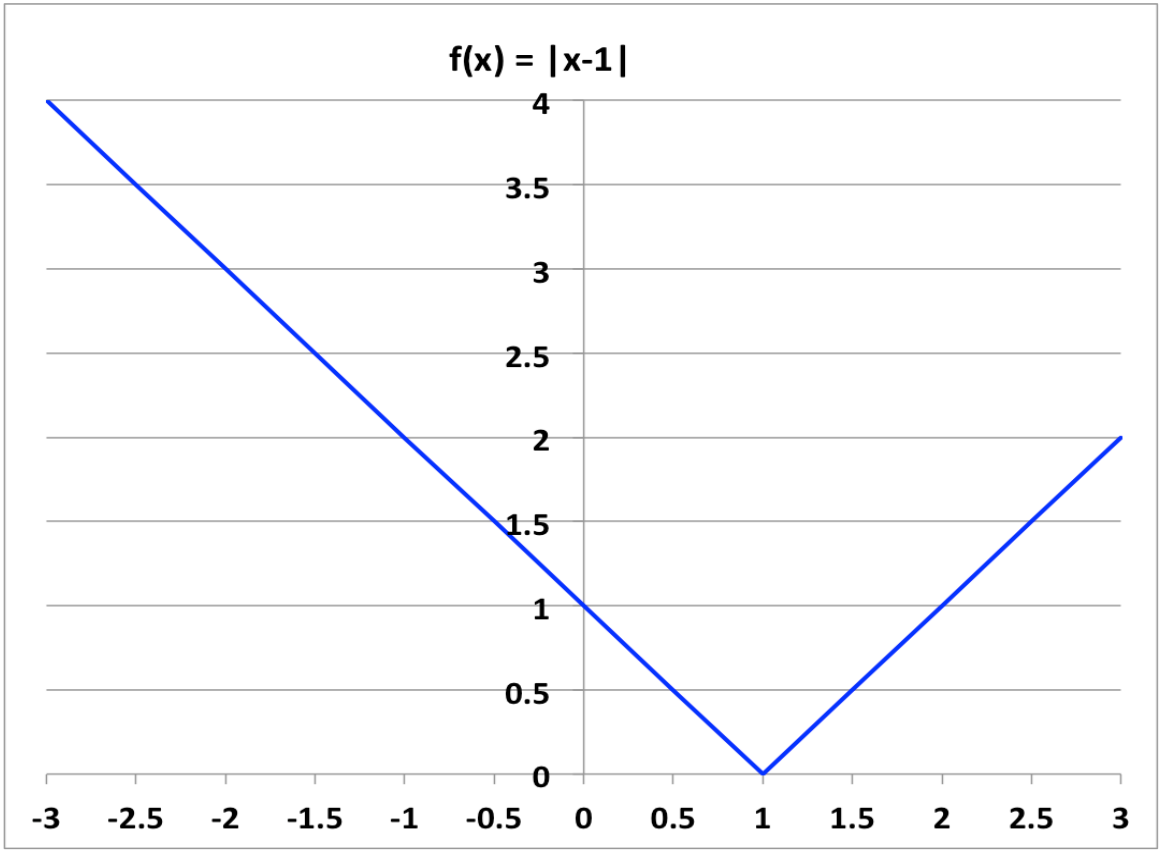
Problem 4

PART A

0 points possible (ungraded)

For each part, determine whether the function is convex or not over its domain.

- Exit Survey



$f(x) = |x - 1|$ for $-3 \leq x \leq 3$.

- Not Convex
- Convex ✔

EXPLANATION

Solution

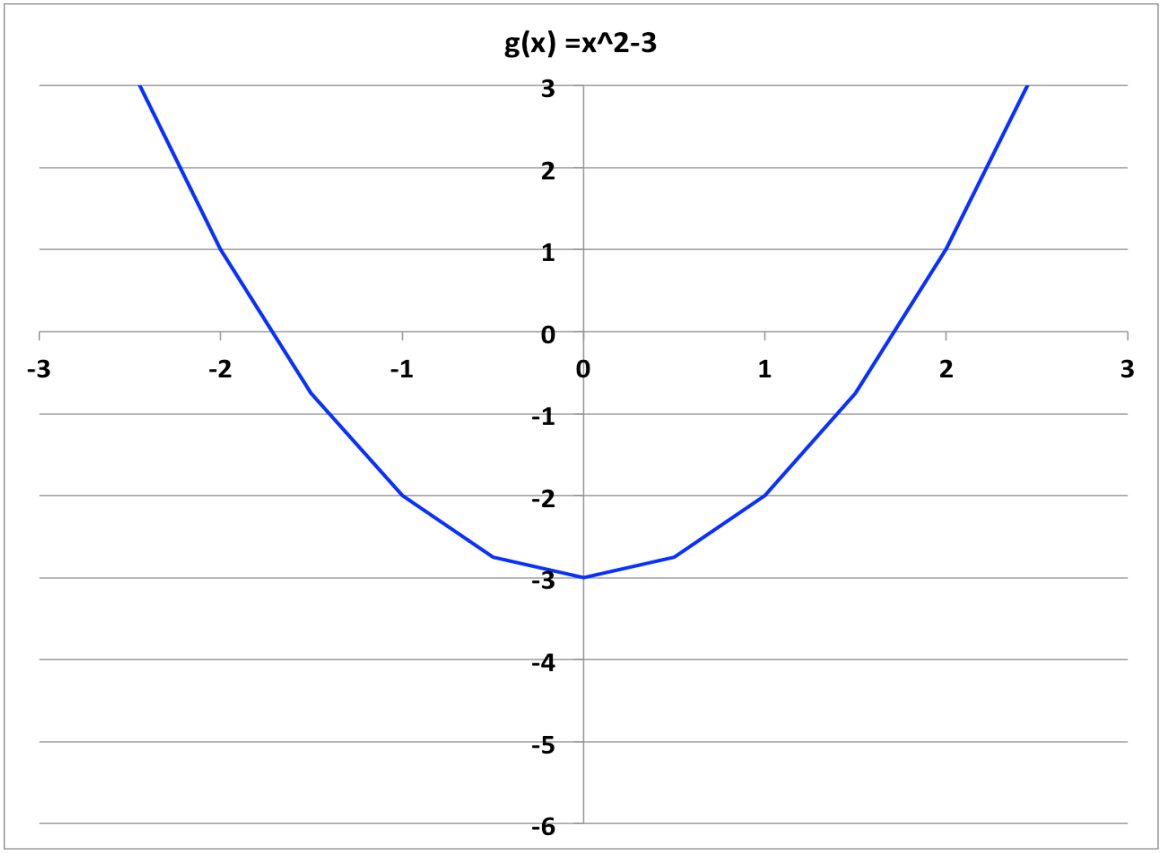
$f(x)$ is convex.

Submit

✔ Correct

PART B

0 points possible (ungraded)



$g(x) = x^2 - 3$ for $-3 \leq x \leq 3$.

- Not Convex
- Convex ✔

EXPLANATION

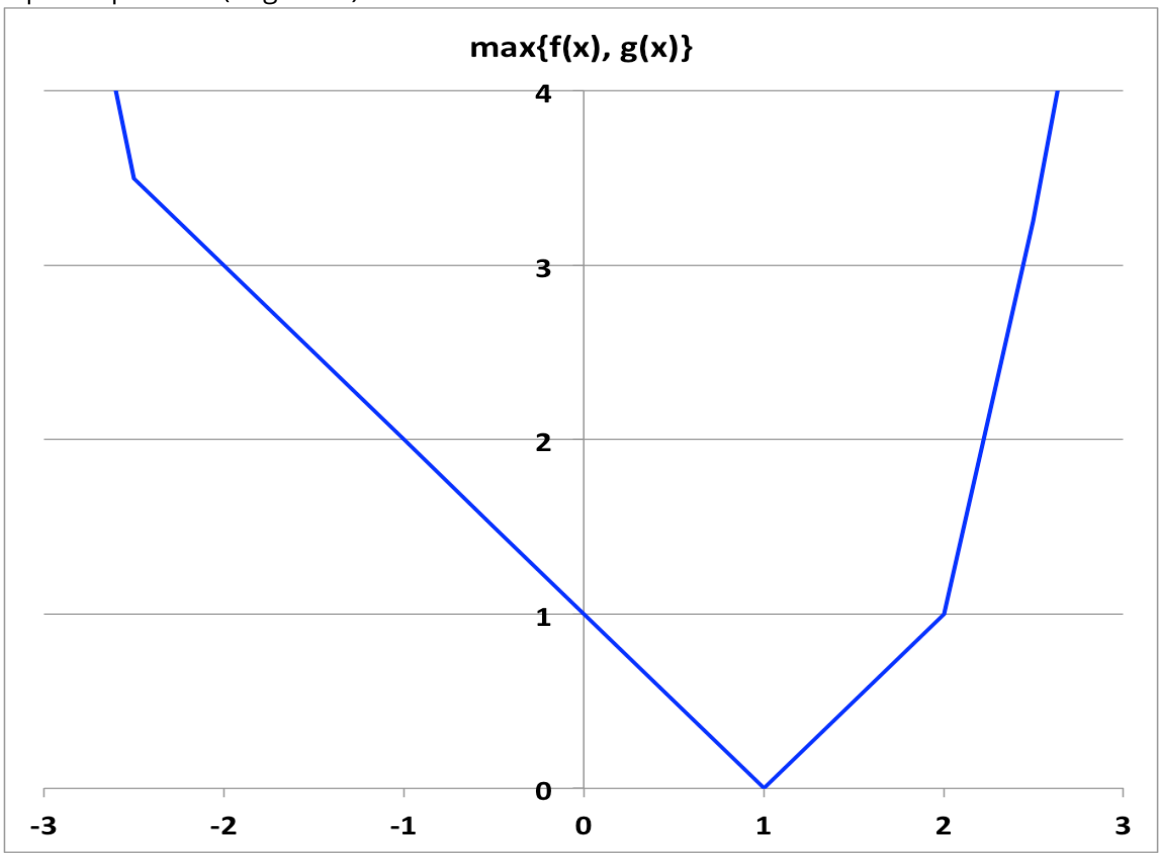
Solution: g(x) is convex.

Submit

✔ Correct

PART C

0 points possible (ungraded)



$h(x) = \max\{|x-1|, x^2 - 3\}$ for $-3 \leq x \leq 3$.

- Not Convex
- Convex ✔

EXPLANATION

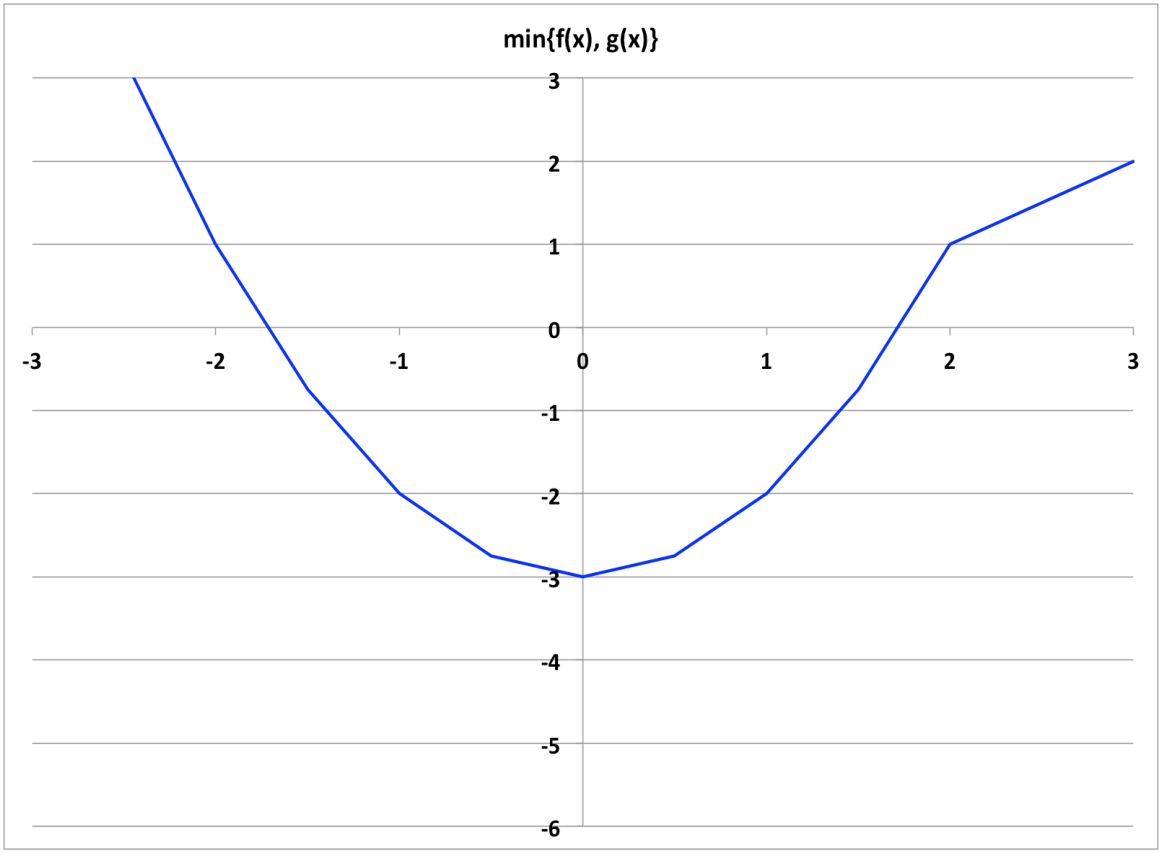
Solution: The function $h(x)$ is convex.
In general, the maximum of two convex functions is convex.

Submit

✔ Correct

PART D

0 points possible (ungraded)



$h(x) = \min\{|x-1|, x^2 - 3\}$ for $-3 \leq x \leq 3$.

- Convex
- Not Convex ✔

EXPLANATION

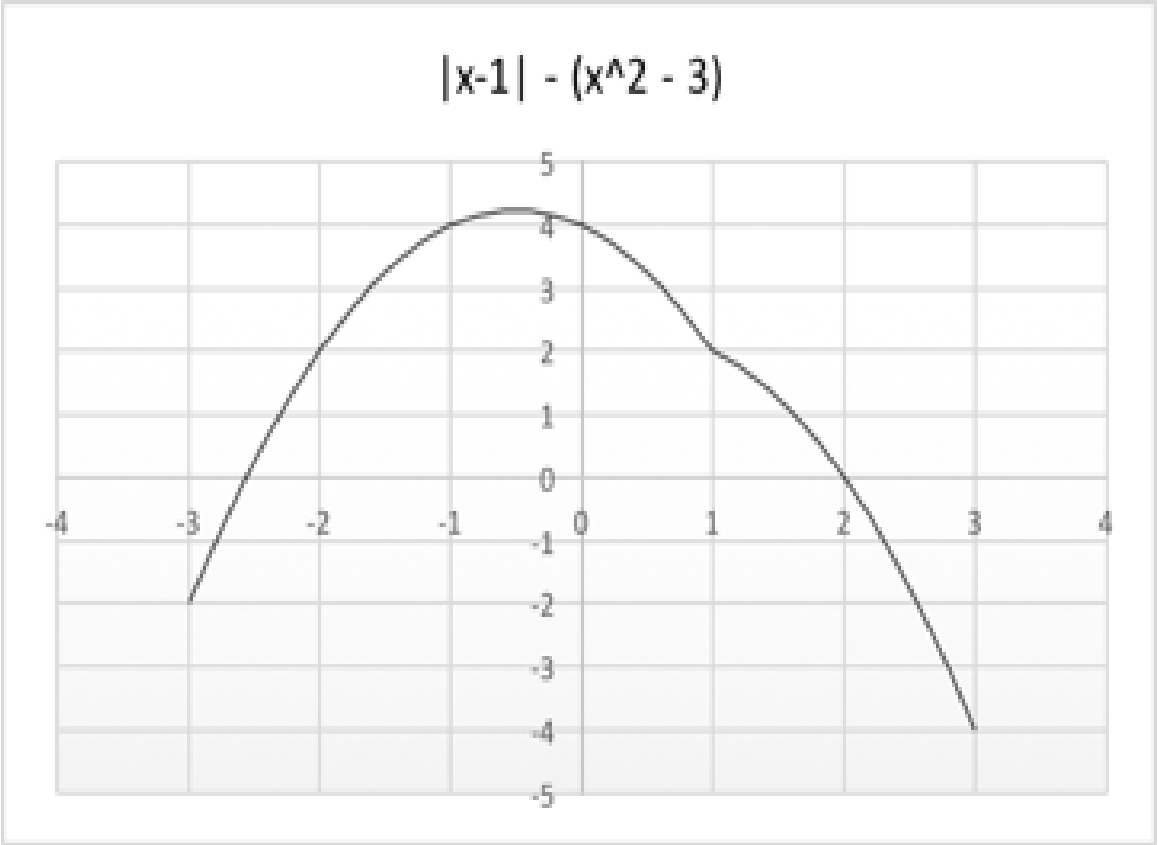
Solution The function $h(x)$ is not convex.
The minimum of convex functions is not necessarily convex.

Submit

✔ Correct

PART E

0 points possible (ungraded)



$h(x) = |x-1| - (x^2 - 3)$ for $-3 \leq x \leq 3$.

- ◉ Not Convex ✔
- ○ Convex

EXPLANATION

Solution: The function $h(x)$ is not convex. The difference of two convex functions is not necessarily convex.

Submit

✔ Correct