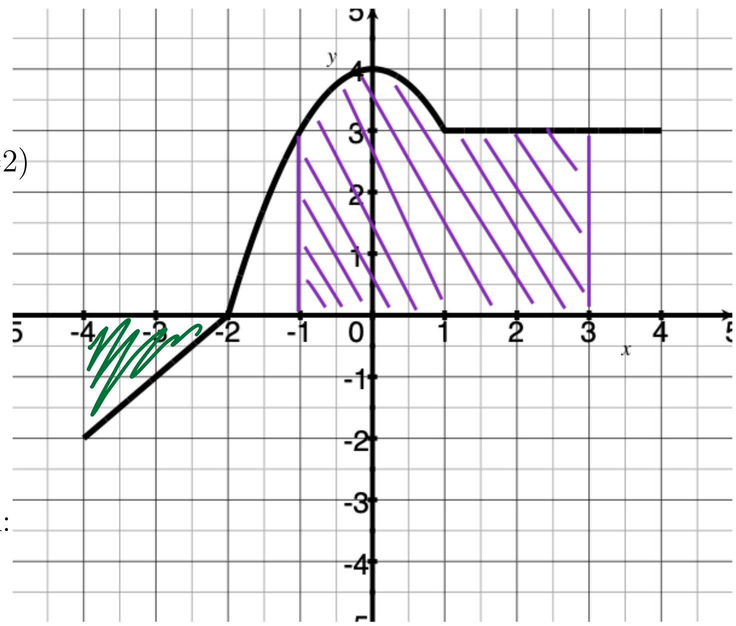
Quiz 1

Key

Will remove location of question for future quizzes?

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

1. Consider the piece-wise defined graph $f(x)$ consisting of a parabola and straight lines.



   (a) [1] Estimate $f(1)$.

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   (b) [2] (Activity: DefiniteIntegrals#2) Describe the area shaded as a definite integral involving $f(x)$.

   $\int_{-1}^{3} f(x)\,dx$

   (c) [2] Find the formula for the function f in the indicated form:

$$f(x) = \begin{cases} x+2 & \text{if } -4 \le x \le -2 \\ -x^2+4 & \text{if } -2 < x \le 1 \\ 3 & \text{if } 1 < x \le 4 \end{cases}$$

   line $y = mx + b$, slope $= 1$, thru $(-2, 0)$ $\Rightarrow 0 = (-2)(1) + b \Rightarrow 2 = b$

   quad $y = a(x-h)^2 + k$, vertex @ $(0, 4)$, $y = a(x-0)^2 + 4$ thru $(-1, 3)$ $\Rightarrow 3 = a(-1)^2 + 4 \Rightarrow -1 = a$

   (d) [3] (WrittenHW§5.2 #36) Evaluate $\int_{-4}^{0} f(x)\,dx$ exactly.

$$= \int_{-4}^{-2} x+2\,dx + \int_{-2}^{0} -x^2+4\,dx = -\left(\tfrac{1}{2}\right)(2)(2) + \left[-\tfrac{1}{3}x^3 + 4x\right]_{-2}^{0}$$

$$= -2 + \left[\tfrac{-1}{3}\cdot 0 + 4\cdot 0\right] - \left[\tfrac{+8}{3} - 8\right] = -2 - \tfrac{8}{3} + 8 = 6 - \tfrac{8}{3} = \tfrac{10}{3}$$

2. [2] (WebHW5-3 #5) Let $g(t)$ be such that we know $\int_0^6 g(t)\,dt = 24$. Find $\int_0^6 g(t) - 3\,dt$

$$\int_0^6 g(t) - 3\,dt = \int_0^6 g(t)\,dt - \int_0^6 3\,dt = 24 - 3(6-0) = 6$$