Test 6

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Exercise 1

Answer: b

Exercise 2

$x_{k+1} = \underset{x\in\mathbb{R}^n}{\operatorname{argmin}} [\langle\nabla f(x_k), x - x_k\rangle + \frac{1}{\gamma_k V(x,x_k)}],$ where $V(x, x_k) = d(x) - d(x_k) - \langle\nabla d(x_k), x - x_k\rangle$

Answer: c

Exercise 3

(a) $d(x) = -\log x,\ V(x, y) = \frac{x}{y} - \log\frac{x}{y} - 1 = \frac{x}{y} + \log\frac{y}{x} - 1$

(b) $\frac{1}{x^2}$ - don't know

(c) $d(x) = x\log x - x,\ V(x, y) = x\log\frac{x}{y} - x + y$

(d) ok

Since only one statement is wrong:
Answer: c

Exercise 4

$s1, s2, s3$ should be linear independent

(a) $2s_1 = s_3$

(b) ok

(c) $s_1 = -s_2 - s_3$

Answer: b

Exercise 5

$\text{prox}_f(x) = \underset{u}{\text{argmin}} f(u) + \frac{1}{2}||u - x||_2^2$

(a) True from lecture

(b) $2\lambda u + (u - x) = 0 \Rightarrow u = \frac{x}{2\lambda+1}$

(c) $\frac{\lambda}{u} + (u - x) = 0 \Rightarrow u^2 - ux + \lambda = 0 \Rightarrow u = \frac{x \pm \sqrt{x^2 - 4\lambda}}{2}, u = \frac{x - \sqrt{x^2 - 4\lambda}}{2}$ – argmin

(d) ok

Answer: c