MATH 131-03, Fall, 2017 Homework 1 - Solutions

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$s(t) = 2\sin(\pi t) + 3\cos(\pi t)$

$s(1) = 2\sin(\pi) + 3\cos(\pi) = -3$

(a) Calculate the average velocities over $[1, b]$ in two ways:

(1) $v_{\text{ave}}(1, b) = \dfrac{s(b) - s(1)}{b - 1} = \dfrac{2\sin(\pi b) + 3\cos(b\pi) + 3}{b - 1}$

b	$y = \dfrac{2\sin(\pi b) + 3\cos(b\pi) + 3}{b - 1}$
2	6
1.1	−4.712035
1.01	−6.134120
1.001	−6.268371

(2) $v_{\text{ave}}(1, 1 + h) = \dfrac{s(1 + h) - s(1)}{h} = k(h) = \dfrac{2\sin(\pi(1 + h)) + 3\cos(\pi(1 + h)) + 3}{h}$

h	$y = \dfrac{2\sin(\pi(1 + h)) + 3\cos(\pi(1 + h)) + 3}{h}$
1	6
0.1	−4.712035
0.01	−6.134120
0.001	−6.268371

(b) Estimate the velocity at $t = 1$ (as $b \to 1$ or $h \to 0$): $v(1) \approx -6.268371$.