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Name: _____.

MA 26500-215 Quiz 9

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1. Let $\mathcal{P}_2$ be the set of all polynomials of degree less than or equal to 2. We define an inner product on $\mathcal{P}_2$ by

$$\langle p(t), q(t) \rangle = \int_{-1}^{1} p(t)q(t)\,\mathrm{d}t \qquad (\bigstar)$$

for polynomials $p(t), q(t) \in \mathcal{P}_2$.

(a) (12 points) The set $\{1, t, t^2\}$ is a basis for $\mathcal{P}_2$. Use the Gram–Schmidt process to find an orthonormal basis for $\mathcal{P}_2$ using the inner product ($\bigstar$).

(b) (8 points) Find an orthonormal basis for $\mathcal{P}_2$. [*Hint:* Use the normal basis you found in part (b).]