Name: _____ _____ / 25

There are 25 points possible on this quiz. *You should be able to complete it without using your notes or textbook or a calculator — this is practice for your exams!* If you needed to look something up, you should to me about questions you might have. **Show all work for full credit** and use some words or sentences to help communicate your answers.

1. [4 points] Define $G(x) = \int_0^x f(t)\,dt$ where the graph of $f(t)$ is drawn below.
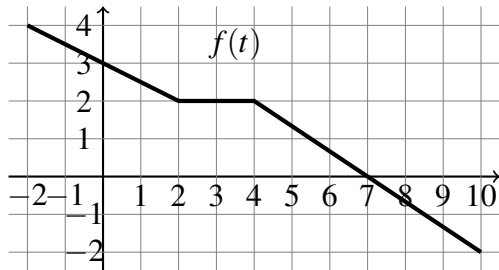
a. Determine $G(4)$.

b. Does $G(x)$ have a maximum on the interval $[0, 10]$? Explain your answer.

2. [6 points] Evaluate each definite integral using the Fundamental Theorem of Calculus Part 2.

a. $\int_1^9 \dfrac{6}{\sqrt{x}}\,dx$

b. $\int_0^{\pi/3} (12 - 2\sin(x))\,dx$

3. [4 points] Evaluate $\int_0^{\pi/4} (\sec(\theta))^2 \tan(\theta)\,d\theta$. Show your work.

4. [6 points] Use the Fundamental Theorem of Calculus (Part 1) to find each derivative.

    a. $\dfrac{d}{dx}\left(\displaystyle\int_6^x t^5 - \dfrac{2}{t}\, dt \right)$

    b. $\dfrac{d}{dx}\left(\displaystyle\int_{\cos(x)}^4 \sqrt{1-t^2}\, dt \right)$

5. [5 points] A ball is thrown upward from an initial height of 4 ft at an initial speed of 10 ft/s. The acceleration due to gravity is 32 ft/s^2. (Just to be clear, we are assuming $a(t) = -32$ is the equation modeling the acceleration of the ball.)

    a. Solve for $v(t)$, the velocity of the ball t seconds after it is thrown into the air. (Use calculus techniques.)

    b. Solve for $h(t)$, the height of the ball t seconds after it is thrown into the air. (Use calculus techniques.)

    c. At what time is the ball the highest? Show your work, and answer the question with a sentence.