MATH 160 Exam 4 **Name** _____

CCU Dept. of Math/Stats

Sample B **Score** _____

1. (28 points) Evaluate the following indefinite integrals.

(a) $\int 10x^4 - 6x^2 + 4x + 8 \, dx =$

(b) $\int \sqrt[5]{x^7} + \frac{9}{x^4} \, dx =$

(c) $\int \sec(x)\tan(x) - \csc^2(x) \, dx =$

(d) $\int \frac{8x^{-3} + 18x^8}{x^2} \, dx =$

2. (16 points) Evaluate the following integrals. Show your work. If you choose to make an educated guess, be sure to check your answer as justification of your work.

(a) $\displaystyle\int \frac{12x^2}{x^3+7}\,dx =$

(b) $\displaystyle\int \sin(\theta)\sin(\cos(\theta))\,d\theta =$

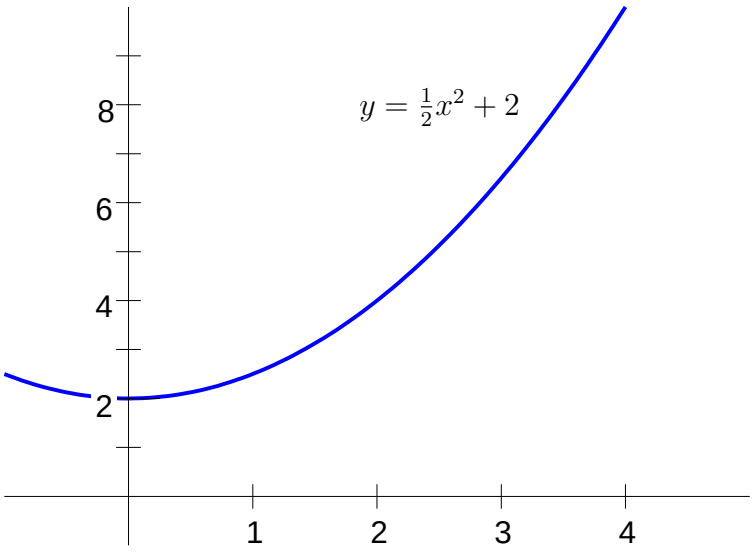
3. (14 points) Evaluate the following definite integrals. Show work.

(a) $\displaystyle\int_0^{\ln 6} 4\mathrm{e}^{2x}\,dx =$

(b) $\displaystyle\int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \sec^2(x)+\cos(x)\,dx =$

4. (12 points) The graph of $y = \frac{1}{2}x^2 + 2$ is shown below.

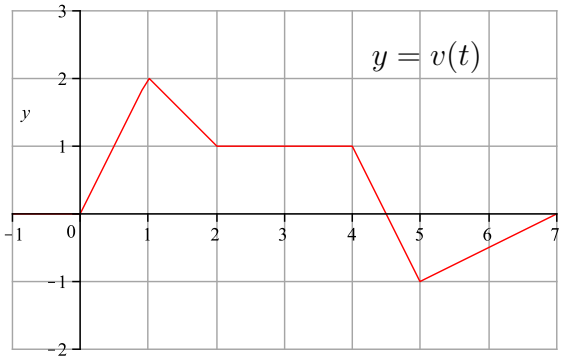
   (a) Divide the closed interval $[1, 4]$ into 3 equal subintervals and draw the corresponding rectangles using the **right** endpoints of each subinterval.



   (b) Find the Riemann sum for $y = \frac{1}{2}x^2 + 2$ on the interval $[1, 4]$ for $n = 3$, taking the sample points to be right endpoints.

   (c) Express the integral $\int_1^4 \frac{1}{2}x^2 + 2 \, dx$ as a limit of Riemann sums. Do not evaluate the limit.

5. (12 points) The graph below represents the velocity (mi/min) of Professor Green riding a bicycle from his home to CCU. Professor Green lives 3.5 miles due west of campus, and traveling east is considered to be the positive direction.



(a) Find the total distance traveled by Professor Green during the first 3 minutes of his ride.

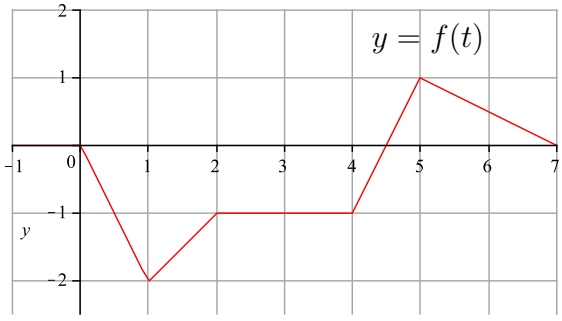
(b) What is Professor Green's acceleration at $t = 3$ minutes?

(c) What are some possible reasons why Professor Green's velocity is negative after 4.5 minutes?

6. (18 points) Consider the following function

$$g(x) = \int_0^x f(t)dt$$

where f is the function whose graph is shown below.



(a) Evaluate

i. $g(1) =$

ii. $g(3) =$

iii. $g(7) =$

(b) On what interval is g decreasing? Explain.

(c) Where does g have a minimum value? Explain.