1. Evaluate the following integrals.

   (a) $\displaystyle\int_0^1 \frac{t\,dt}{\sqrt{t^2+5}}$

   (b) $\displaystyle\int \frac{\ln y}{\sqrt{y}}\,dy$

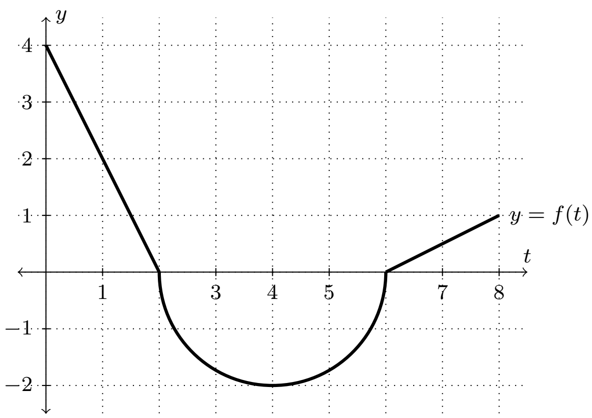
   (c) $\displaystyle\int \frac{x-4}{(x-3)(x-2)}\,dx$

2. If $g(x) = \left(\int_{\sin x}^{0} \sqrt{1+t^6}\, dt \right)$ then what is $g'(\pi)$?

3. Suppose that $f(t)$ is continuous for all t, and let $g(x) = \int_0^x f(t)\, dt$. Determine if the following statement is true or false: "$g(x)$ must be continuous." Either justify why the statement is true, or sketch a function which provides a counterexample.

4. *Without* doing any calculations, is L_{50} an over- or under-estimate for $\displaystyle\int_0^2 t^4\, dt$? Briefly justify your answer, and include a diagram which supports your answer.

5. Let $g(x) = \int_4^x f(t)\, dt$, where $y = f(t)$ is graphed below with $0 \leq x \leq 8$.



(a) Find $g(0)$, $g(2)$, $g(4)$, $g(6)$ and $g(8)$.

(b) Where is $g(x)$ increasing? Where is it decreasing?

(c) Where is $g(x)$ concave up? Where is it concave down?

(d) Where does $g(x)$ have local minima and maxima? Find the absolute maximum and minimum for $0 \leq x \leq 8$.

6. The integral $\int_0^5 (1+3x)\,dx$ can be expressed as the Riemann sum $\lim_{n\to\infty} \sum_{i=1}^{n} \left(1+\frac{15i}{n}\right)\left(\frac{5}{n}\right)$. Calculate the value of the integral by evaluating this limit.

7. Express the integral $\int_1^3 e^{4x}\,dx$ as a limit of a Riemann Sum, using right endpoints. You do not need to evaluate the sum or the limit!