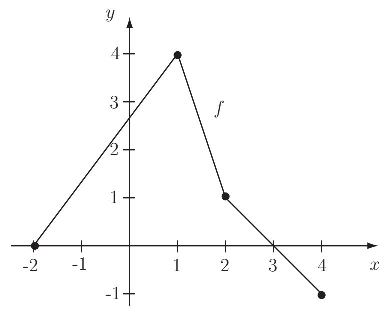
Chp 6 Problems Name:____________________________

Show all relevant work!

1. The graph of the function f, consisting of three line segments, is given below.
Let $g(x) = \int_1^x f(t)\,dt$. Compute (and show your reasoning) . . .

   (a) $g(4)$: __________

   (b) $g(-2)$: __________



2. Use calculus to help you write the equation of the line tangent to $f(x) = \int_1^{x^2} e^{1-t^3}\,dt$ at $x = 1$.
Use it to approximate the value of $f(1.4)$.

3. Where is the function, $f(x)$, in question #3 at its minimum?

4. Suppose $\int_0^1 f(x)\,dx = k$,where k is a constant. Evaluate $\int_0^1 xf(1-x^2)\,dx$ and give your answer in terms of k.

5. The Tesla Model S P85D is reported to accelerate from 0–60 mph (88 ft/sec) in 3.2 seconds.
How far does it travel during that time?

6. With t in years since 2000, the population, P, of the world in billions can be modeled by $P = 6.1e^{0.012t}$.
Use the Fundamental Theorem to predict the average population of the world between 2000 and 2010.

7. My dog likes to walk according to the function $v(t) = t\sin t$ where t is in seconds and $v(t)$ is her velocity in feet per second as she walks north (+) and south (–), relative to her house.

   (a) Find the formula (using calculus) for her position, $s(t)$, relative to home as a function of time.
   Assume that when she begins walking she is 20 feet north of her house.

   (b) She reverses direction often after she starts walking. When are the first three times she reverses direction?

   (c) Assume she stops walking after $t = 3\pi$ seconds. Find her average velocity since she started walking.

   (d) Repeat (c) for her average *speed* over this time.